

A.6 Ph.D. exams

List of Ph.D.-exams within the programme sorted after projects. All thesis titles are found in a table at the end as are affiliations. The column “%SSF” shows the amount of funding from the programme calculated as a mean over the years the person was in the programme. The column “6 months later” shows where the person was working 6 months after the exam.

Name	Year of birth	Gender	Thesis title	Year of registration	Year of dissertation	Supervisors (*main)	Affiliation	%SSF	6 months later	Comments
Optimal surface topography for bone anchored implants										
Carin Hallgren-Höstner	1971	F	T1	1996	2001	Ann Wennerberg*, Tomas Albrektsson	GU3	80-90	AstraTech	
Tribology of articulating joints										
Xunhua Yuan	1959	M	T2	1997	2000	Leif Ryd*	LU	50		
Warren McDonald	1954	M	T3	1999	2000	Lars Carlsson*, Magnus Jacobsson	GU3	100		
Yannick Luisetto	1975	M	T4	1999	2002	Frans Maurer*, Lars Lidgren	LU	100		
Uldis Kesteris	1961	M	T5	2001	2001	Hans Wingstrand*, Rolf Önerfält	LU	0		
Ana Alonso Vázquez		F	T6	2003	2003	Mark Taylor, Lars Lidgren	LU	0		
Screening of tissue integrated materials										
Karin Glasmästar	1971	F	T7	1998	2002	Bengt Kasemo, Julie Gold, Ann-Sofie Andersson, Duncan Sutherland	C1	80	Chalmers/GU	Financed by the Biomaterials Consortium until 1 June 2000
A systematic approach to improve blood compatibility of biomaterials for cardiovascular applications										
Matilda Johnell	1961	F	T8	1998	2003	Agneta Siegbahn*, Rolf Larsson	UU5	100	UAS	
Jaana Hong	1955	M	T9	1999	2001	Bo Nilsson*, Rolf Larsson, Kristina Nilsson-Ekdahl	UU1	100	UAS	
Jonas Andersson	1973	M	T10	1999	2003	Bo Nilsson, Kristina Nilsson-Ekdahl, Rolf Larsson	UU1	75	UAS	

Name	Year of birth	Gender	Thesis title	Year of registration	Year of dissertation	Supervisors (*main)	Affiliation	%SSF	6 months later	Comments
Time and functionally programmed surfaces										
Per Hanarp	1974	M	T11	1998	2003	Bengt Kasemo*, Julie Gold, Duncan Sutherland	C1	90	-	GSMS Free mover
Eva Kälvesten	1972	F	T12	1997	2003	Pentti Tengvall*	LiU	80	-	
Jonas Wetterö	1972	M	T13	1997	2003	Pentti Tengvall*, Torbjörn Bengtsson	LiU	1 year 40	-	Financed by the Bio-materials Consortium until Jan 2001
Šarūnas Petronis	1972	M	T14	1997	2002	Bengt Kasemo*, Julie Gold, Pentti Tengvall	C1	80	Chalmers/GU researcher	Financed by the Bio-materials Consortium until Jan 2000**
Johan Benesch	1969	M	T15	1996	2001	Pentti Tengvall*	LiU	1 year 40	Start-up company (Ulf Helmersson, LiU)	Financed by Forum Scientium**
Mussel adhesive proteins										
Camilla Fant	1974	F	T16	1997	2002	Hans Elwing*, Fredrik Höök	GU2	100	Maternity leave	

** Jointly active in the TFPS project and in their host program

Thesis titles

T1	On the bone response to different implant textures. A 3D analysis of roughness, wavelength and surface pattern of experimental implants.
T2	Accuracy Analysis of RSA and Development of Roentgen Single-plane Photogrammetric Analysis.
T3	On Component Integration in Total Hip Arthroplasty: Preclinical Evaluation
T4	Degradation Mechanism and Effects of Vitamin E Addition in UHMWPE Hip Implants
T5	Wear and loosening in cemented hip arthroplasty.
T6	Assessment of ankle arthrodesis with internal fixation using finite element analysis.
T7	Surface Modifications for Biointerfaces - Supported Lipid Bilayers and some Aspects of Microcontact Printing
T8	Monocytes, Tissue Factor and Heparin-coated Surfaces
T9	Investigation of Incompatibility Reactions Caused by Biomaterials in Contact with Whole Blood Using a New <i>in vitro</i> Model.
T10	Complement Activation Triggered by Biomaterial Surfaces.
T11	Optical properties of nanometer disks, holes and rings prepared by colloidal lithography.
T12	Blood protein coated model biomaterials - preparation, and cell and tissue response
T13	Acute inflammation on model biomaterial surfaces - studies on proteins, neutrophils and platelets
T14	Functionalized biomaterial surfaces by micro- and nanofabrication.
T15	Null Ellipsometry for the Analysis of Protein Deposition onto Model Biomaterials
T16	Studies on Cross-Linking and Protein-Protein Interactions of Adhesive Proteins from the Blue Mussel

Affiliations

GU3	Dept. of Biomaterial/ Handicap Research, Göteborg University
LU	Dept. of Orthopaedics, Lund University
C1	Dept. of Applied Physics, Chalmers University of Technology and Göteborg University
UU1	Dept. of Clinical Immunology and Transfusion Medicine, Uppsala University
UU5	Dept. of Clinical Chemistry, Uppsala University
LiU	Lab. Applied Physics, IFM, Linköping University
GU2	Cell and molecular biology, Göteborg University

A.7 Lic exams

List of Licentiate exams within the programme sorted after projects. All thesis titles are found in a table at the end as are affiliations. The column “%SSF” shows the amount of funding from the programme calculated as a mean over the years the person was in the programme. The column “6 months later” shows where the person was working 6 months after the exam.

Name	Year of birth	Gender	Thesis title	Year of registration	Year of presentation	Supervisors (*main)	Affiliation	%SSF	6 months later	Comments
Optimal surface topography for bone anchored implants										
Henrik Reimers	1970	M	LT3	1997	2001	Dinko Chakarov*, Bengt Kasemo, Julie Gold	C1	100	Scandimed	
Tribology of articulating joints										
Mohammed Hoseini	1966	M	LT4	1999	2001	Jukka Lausmaa*, Antal Boldizar	SP	80	SP	
Time and functionally programmed surfaces										
Per Hanarp	1974	M	LT1	1998	2001	Bengt Kasemo*, Julie Gold, Duncan Sutherland	C1	80	Continued w. Ph.D.	GSMS Free mover
Sārūnas Petronis	1972	M	LT2	1997	2000	Bengt Kasemo*, Julie Gold, Pentti Tengvall	C1	80	Continued w. Ph.D.	Financed by the Biomat. Cons. until Jan 2000
Supported biomembranes										
Erik Reimhult	1974	M	LT5	1999	2002	Bengt Kasemo*, Fredrik Höök,	C1	15	Continued w. Ph.D.	
Charlotte Larsson	1976	F	LT6	2000	2003	Fredrik Höök*, Bengt Kasemo	C1	25	Continued w. Ph.D.	
Kristian Dimitrievski	1974	M	LT7	2000	2004	Bengt Kasemo*, Vladimir Zhdanov	C1	15	-	
Theoretical modelling and simulations										
Kristian Dimitrievski	1974	M	LT7	2000	2004	Bengt Kasemo*, Vladimir Zhdanov	C1	15	-	

Lic. thesis titles

LT1	Nanofabrication with Colloidal Particles
LT2	Topographic Micropatterning of Biomaterials using Silicon Templates
LT3	Laser micropatterning of medical implants.
LT4	Tribology of artificial joints.
LT5	Vesicles vs. Surfaces
LT6	Functionalized lipid assemblies for biosensing applications
LT7	Simulations of protein folding and formation of supported biomembranes via vesicle adsorption

Affiliations

C1	Dept. of Applied Physics, Chalmers University of Technology and Göteborg University
SP	Dept. Chemistry and Materials Technology, SP, Borås

A.8 Future exams

List of coming exams related to the projects. A table below shows the abbreviations used for the affiliations. The column “%SSF” shows the amount of funding from the programme calculated as a mean over the years the person is (or will be) funded by the programme.

Name	Year of birth	Gender	Year of registration	Planned year of PhD/Lic	Supervisors (*main)	Affiliation	%SSF	Comments
Optimal surface topography for bone anchored implants								
Anna Göransson		F	2001		Ann Wennerberg*	GU3	50	
Tribology of articulating joints								
Fred Kjellson	1971	M	1999	PhD 2005	Lars Lidgren*, Leif Ryd, Elizabeth Tanner	LU	80-90	
Supported biomembranes								
Håkan Rapp	1970	M	2000	Lic 2004	Igor Zoric*, Bengt Kasemo	C1	25	
Lotus-leaf effect								
Per Holgerson	1977	M	2003	Lic 2005	Dinko Chakarov*, Duncan Sutherland	C1	100	

Affiliations

GU3	Dept. of Biomaterial/ Handicap Research, Göteborg University
LU	Dept. of Orthopaedics, Lund University
C1	Dept. of Applied Physics, Chalmers University of Technology and Göteborg University

A.9 No exams

Nothing reported.

A.10 Innovations, prototypes and spin-off companies

So far, no innovations, prototypes or spin-off companies have been reported from the Biocompatible Materials programme.

A.11 Patents

In total, 7 Patent applications has been filed from the following projects within the Biocompatible Materials programme:

Optimal surface topography for bone anchored implants

Submission date	Inventor(-s):	Title
98-04-06	Jan Hall, Bengt Kasemo, Staffan Sjödin	Implantat med väldefinierad yttopografi

Tribology of articulating joints

Submission date	Inventor(-s):	Title
		PMMA and nonionic radiographic contrast media. Granted patent: SE 511 087 Patent appl: EP 107 9867 A1 Patient appl: US 09/700,955
		A method for the preparation of UHMWPE doped with an ... Patent appl: EP 00909859 1 Granted patent: US 6,448,315

Screening of tissue integrated materials

Submission date	Inventor(-s):	Title
0012	A-S Andersson, K Glasmästar, P Hanarp, DS Sutherland	Förfarande för ytmodifiering Patent No: P.ans. 0004807-4
0012	K Glasmästar, A-S Andersson, P Hanarp, D Sutherland	Förfarande och anordning vid ytmodifiering Patent No: P.ans. 0004806-6

Time and functionally programmed surfaces

Submission date	Inventor(-s):	Title
Feb. 2001	J Gold, S Petronis, A Wennerberg	Biomedical device, UK patent application 0104525.1
Feb. 1998	Pentti Tengvall	Patent pending 29260/BN on "Determination of Polymerization/Coagulation in a fluid". In collaboration with Global Hemostasis Institute MGR AB (GHI AB, Linköping).

A.12 Awards

The following awards have been granted members of the Biocompatible Materials programme.

Name	Award for	Comments
Ann Wennerberg	Best publication in Int. J. Oral & Macillofacial Impl. year 2000 (2:13 p. 41)	The price was distributed in 2002
Pentti Tengvall	Award Best Paper 2000, Journal of Materials Science: Materials in Medicine.	
Karin Glasmästar	Belonged to the group that was awarded for the best idea in solving a clinical problem. International Tissue Engineering Symposium 2000, Twente/Utrecht, The Netherlands.	
Šarūnas Petronis	The Biomaterials Research Center award for the best poster presentation "A New Approach To Investigate Mechanical Cell–Substrate Interactions Using Microfabricated Model Surfaces", Summer School In Biomaterials, Ellös, Sweden 2001.	
Jonas Wetterö	Finalist (3rd place, Honorable Mention) in the 2001 Student Investigator Recognition Competition, Proteins and Cells at Interfaces Special Interest Group, for research presented at the 2001 Annual Meeting of the (American) Society for Biomaterials, Saint Paul, Minnesota, USA.	
Per Holgerson	Albihns award for technical creativity	Master thesis work (2003)
Bengt Kasemo	George Winter Award from the European Society for Biomaterials, 1999.	
Bengt Kasemo	Akzo Nobel Prize, awarded by the Royal Swedish Academy for Engineering Sciences (shared with Ingemar Lundström LiU.), 2001.	

A.13 Summary of goals

In the programme plan from May 7 1997 for the three SSF-programmes “Graduate School in Materials Science”, “Molecular Engineering in Polymer Science” and “Biocompatible Materials”, quantitative and qualitative goals are listed. In this Appendix, the original goals are compared with the actual outcome from the programmes. Please notice that the goals were not fully separated between the different programmes, and we have chosen to keep the same format in this Appendix. After the Table below, there is a brief discussion of some of the quantitative and qualitative goals. For most of the rows in the Table, there are also brief comments directly after the table.

Quantitative goals

		Goal ^a	Polymer	Bio-comp	Grad Sc	Diff from goal
1	Total numbers of PhDs in 5 years up to year 2002	72	5	14	ca 100	ca +50
2	Grad. School program, SSF funding	>10	-	-	10	± 0
3	Grad. School program, other funding	20	-	-	ca 90	+70
4	Biocompatible Materials, SSF funding	20	-	10.6	-	-9.5
5	Biocompatible Materials, other funding	10	-	3.4	-	-6.6
6	Molecular Engineering Polymers, SSF funding	8	2.9	-	-	-5.1
7	Molecular Engineering Polymers, other funding	4	2.1	-	-	-1.9
8	Fraction of female PhDs	>40%	20%	43%	ca 45%	ca ± 0
9	Patents up to year 2002	20	-	7	-	-13
10	Number of publications in international refereed journals	125 (25/y)	49	144	-	+58
11	Number of invited talks and articles	125 (25/y)	>15	57	-	ca -53
12	Number of students applying	>250 (>50/y)	-	-	-	-
Additional internal funding (MSEK)						
13	Grad. School	29 (5.8/y)	-	-	-	-
14	Biocompatible materials	25 (5.0/y)	-	12,7	-	-12.3
15	Molecular Engineering Polymers	15 (3.0/y)	3,5	-	-	-11.5
Additional external funding (MSEK)						
16	Grad. School	17.5 (3.5/y)				
17	Biocompatible materials	12.5 (2.5/y)				
18	Molecular Engineering Polymers	10 (2.0/y)				
19	Sum rows 16-18 (MSEK)	40	8.5			-31.5
20	Number of companies participating	>12	6	13	-	+7
21	Economical and personnel volume of industrial involvement (MSEK)					
22	Cash	15 (3/y)	-	3	-	-12
23	Personnel	15 (3/y)	0.2	0.7	-	-14,1
24	Number of "spin-offs" into new techniques, products and/or industrial or clinical problem solving	>15	-	-	-	see comment below
25	International cooperation projects	>20	11	21	-	+12

Comments to the table:

^aThe numbers in the column “Goal” are modified to “total over 5 years” in order to be able to compare with the outcome. The original values are put in parentheses. The limit “up to year 2002” is modified to “up to year 2003”.

Row no:

- 1 Some persons are counted twice here: both in Polymer or Biocomp and in the Grad Sc column. The number “ca 100” is an estimate based on a counting made about 2 years back. Approximately 10 “free movers”, 15 from other associated SSF-programs and 60-70 persons with other funding graduated after following the curriculum of Grad Sc. Since the Grad Sc is still ongoing, the statistics are incomplete.
- 2-7 Number of PhDs financed from respective source. Example: a student financed at 25% by SSF (App 6) counts as “0.25 PhD financed by SSF”. The support needed in order to add up to the value in row no.1 is marked as “other funding”.
- 8 Confer row 1. The 45% of Grad Sc comes from a couple of years back.
- 9 Number of filed patent applications (App 11).
- 10 Number of references in App 5 marked in the column “JA” for journal article. These include all published articles as well as some that were submitted/accepted/in press.
- 11 As row 10 but where the column “I” of App 5 was counted. Regarding Polymer, many conference presentations, including invited talks, were omitted in the reported material. The number “>15” is an underestimated guess.
- 12 More than could be accepted.
- 14-15 The estimated total cost for a PhD student at Chalmers including salary, supervision, conferences, material, courses, dissertation etc is about 0.9 MSEK per year. The difference between this cost and the amount of funding from SSF, calculated over 4 years for the students of rows no. 4 and 6 is regarded as internal funding, and given here.
- 16-18 The programme has attracted significant additional funding. The largest single example is the Instrument grant from KWA of MSEK 10 (see row 19). In addition several of the project leaders have received grants from the Swedish Research Council and Vinnova, for which the present programme has been very important. The same holds for EU contracts (see below). No attempt has been made to measure the additional funding in financial volume.
- 19 This was a grant from the Wallenberg foundation.
- 20 The number of companies involved. Biocomp: see Section 5.9 and Table 7.1; Polymer: see Table 7.1.
- 22 Biocomp: The sum of more continuous support (in total 2.2 MSEK) and the support through the projects described in Section 5.9 (0.8 MSEK).
- 23 The conversion from number of persons involved into MSEK was performed as follows: Let the cost of one person at 100% be 600 000 SEK per year. Further, say that the persons were involved at 2% of their time during 5 years. This gives the total involvement in SEK.
- 24 There was no spin-off company. The amount of technology transfer into clinics and industries turned out to be a goal that is very difficult to measure. Significant such transfer has occurred, e.g. in the collaboration projects. We refrain from attempting a quantitative measure.
- 25 See Table 8.3 in the Biocomp report and Table 8.2 in the Polymer report, respectively.

Comments to the above quantitative goals

- The total number of students (Ph.D.s produced) passing through the GSMS + the research programs became far beyond expectations.
- The relative number of female versus male graduate students met the set goal (40/60).
- The Number of Ph.D.s produced within the programmes were somewhat less than the goals, partly because each student became more expensive in the actual period than anticipated and partly because of a somewhat larger weight of postdocs/young seniors than originally planned. This re-weighting + entering of students into the programme from other sources, is probably the explanation why the scientific production was higher than the set goals in spite of fewer PhDs formally engaged in the programme.
- The scientific production exceeded the projection at the outset. The invited talks became less than the set goal. In hindsight it is obvious that the set goal

was unrealistically high for invited talks. The achieved number must be regarded as very satisfactory. Overall the scientific production has been higher than expected, as measured here. However, there is always a difficulty with publications that are co-funded, so a conservative conclusion is that the scientific production met the set goals.

- The number of patents, the industrial involvement in economic value, spin-offs etc, underperformed with respect to the set goals, in spite of strongly increasing efforts to raise these numbers. The latter is we believe, a consequence of three factors (note that the *number* of industries involved met the set goal): (i) A certain over-optimism on this point. (ii) The economic conditions of the companies that were the target group have been tougher than anticipated. (iii) It takes time to establish and develop the industry contacts. The programme has created a very, strong platform for industrial collaboration, which is expected to pay off in the future. A number of such contacts have been established quite recently. We expect that there will be a pay off in industrial collaboration beyond the present report period.

Qualitative goals

Here we comment on the goal immediately after each of the original goals that were set in the proposal.

- (i) To establish an entirely new, internationally competitive, cross-disciplinary graduate school in materials science, bridging over faculty borders of technical, natural sciences and medical/odontology faculties. A majority (ca 3/4) of the PhDs should be hired by industry.

This goal is really very well met what concerns the character/properties of the graduate school. We regard we have created an invaluable asset for Chalmers /GU both for the future graduate training in Materials Science and for masters and undergraduate training. The hiring by industry of the PhDs has been much lower than anticipated, most likely due to the coincidence of the PhD exams with the recession for the new biotech industry.

- (ii) To establish a truly cross-disciplinary biocompatible materials research program with ca 7-9 top international class, focused projects, with long term importance for Swedish industry, and with spin-off's of direct industrial importance. The projects shall combine materials science, physical sciences, biology, and medical (preclinical and clinical) expertise.

We regard the biocompatibility programme as extremely successful and strong with a continuing dynamic development for the future. This is especially so for the emerging areas e.g. biosensors and biochips, tissue engineering, etc, where there is a number of interesting companies and research initiatives. For the area of medical implants, there is, in spite of successful research in this programme, a more troublesome perspective ahead.

- (iii) To establish a cross-disciplinary research program in the polymer area focusing on molecular engineering of polymers, with ca 5, focused projects of top international class, with long term importance for Swedish industry, and with spin-offs of direct industrial Importance. The projects shall combine chemistry, physics and materials science expertise.

The programme was focussed on 3 main projects, because of the funding level. The three projects have each developed into viable new directions. Some of the polymer activity was in the later part of the program geared into the biocompatible materials area.

- (iv) To perform most of the above projects in collaboration with industries.

See under quantitative goals above. This goal was not generally met, except in some subprojects. Yet we see an increasing such interaction after the termination of the present programmes.

- (v) To construct some of the projects so that they combine the expertise in the polymer and biocompatible materials programmes.

This goal was met through the deliberate reallocation of funding in the polymer project to the biocompatible materials programme, e.g. the project “Polymer surfaces and thin polymer films”, and also to the “Lotus leaf” project between ELIS and Biocompatible Materials.

- (vi) To establish an Advanced Study Group to identify new research opportunities, by combining front line research groups/individuals representing e.g. Mesoscopic physics, Nanotechnology, Polymer physics, Amorphous materials, Physical Chemistry, Biophysics, Biochemistry, Molecular biology, Microbiology, Immunology, Cell membranes/Lipid bilayers, Glycoproteins,...

An advanced study group was established and run for the first 2 years (Mikael Käll and Lars Börjesson. It organized round table discussions and invitations to some of key leaders in the field. In essence many aspects of this were later also built into the projects. A new advanced study group would be timely, and would be centered around slightly different key topics, as follows: Mesoscopic physics, Nanotechnology and nanobiology, Materials science (Soft and hard materials), computations and simulations, advanced spectroscopy and imaging, microbiology, molecular cell biology, stem cells, cell membranes/Lipid bilayers, tissue engineering, biosensing and biochips.

A.14 Case descriptions

Industrial road show

During the period April 2001 – June 2002 a number of industries were visited, with the purpose to expose the two programmes "Biocompatible Materials" and "Molecular Engineering in Polymer Science" to the R&D staffs. All the selected industries are active in areas where the research in the programmes represents existing or potential areas of interest, like e.g. biomaterials and DNA research. The overall impression was that there is a profound interest among industries to assimilate the knowledge built up in the programme, e.g. via research contracts with the academic groups or via regular courses in selected topics like Biomaterials.

The industries visited were:

Biacore AB	2001-04-06	biosensors
Gyros AB	2001-04-06	lab on a disc
Nobel Biocare AB	2001-08-31	dental implants
Artimplant AB	2001-10-15	artificial cartilages
Astra Tech AB	2001-10-25	catheters, implants
Pyrosequencing AB	2002-01-29	DNA analysis
Siemens-Elema AB	2002-01-29	X-ray diagnostics
Boule AB	2002-02-07	haematology systems
Carmeda AB	2002-02-07	blood compatible surfaces
St Jude Medical	2002-02-08	pace makers
Gambro AB	2002-06-04	dialysis

At each site, the programmes were presented during approximately two hours, with emphasis on those areas of particular interest to the listeners. In general, the pro-active approach to present the research was appreciated, and several important contacts were established.

Collaboration projects initiated by industries

To further strengthen the industrial interest in the programme, the Board decided in autumn 2002 to call for proposals for collaboration projects between industries and the research groups within the programme. For obvious reasons the call had to be very limited, and the Project Leaders were therefore asked to contact industries of their own choice, and ask these industries to submit proposals for collaboration projects.

A number of proposals were evaluated by the Board, and as a result five projects were approved for funding. The projects are described in section 2.8, and they clearly demonstrate two important reasons for industrial engagement: (i) The possibility to have temporary access to advanced research instruments with pertinent analytical resources (ii) The possibility to have temporary access to front line knowledge, thereby expanding their own technology platform(s) into new business opportunities.

Cooperation was established with the following industries:

Biacore AB	biosensors
Carmeda AB	blood compatible surfaces
Corline AB	blood compatible surfaces
St Jude Medical	pace makers
Osspol AB	dental implants

The Wallenberg application

In 1998 an inventory was done in the four SSF funded programmes “Biocompatible Materials”, “Molecular Engineering in Polymer Science”, “Graduate School in Materials Science” and “High Performance Outdoor Electrical Insulation” regarding need for scientific equipment. All Project Leaders were asked to put together lists of scientific instruments they believed should strengthen their research capacity. In total, instruments to an estimated value of approximately 26 MSEK were identified. An application to “Knut and Alice Wallenbergs stiftelse” was submitted in autumn 1998. At about the same time, FRN granted approximately 4 MSEK for one of the instruments in the application, thus reducing the amount applied for from 26 MSEK to 22 MSEK. The application was eventually approved with 10 MSEK, with no requirements on how the sum should be allocated on the different instruments.

The programme management and Board were very actively engaged in the following prioritization process, where the overall need for the programme and for the research groups were the main factors guiding the discussion. At the end of the programme, one could conclude that the 10 MSEK from the Wallenberg foundation was used very efficiently, and that the purchased instruments in a profound way increases the experimental and analytical resources of Swedish biomaterials research.

The patent project

The patent project was run as a workshop with meetings spread over a long time, ranging from October 2000 to February 2001. Meetings were arranged where a group of researchers met the experienced inventor Prof. Mats Leijon and three patent engineers. We, the researchers, came quite unprepared to the first meeting, not knowing very much of what was going on or what was expected from everyone. Mats Leijon showed to be a very enthusiastic lecturer. He was not an ordinary lecturer though, but he succeeded in pulling six patentable ideas out of our heads before the end of the meeting. To us, it was a very unusual situation and Mats Leijon taught us a new way of thinking. Or, as someone put it in the evaluation afterwards: “you don’t have to prove anything, it just has to be possible”. It took us a couple of meetings before we got used to this new way of thinking. Between meetings, time was spent on literature and patent searches and especially on finding the limits for what was already known in vicinity of the invention in question. All information was passed over to the patent engineer responsible for the writing and a first draft was made. Later, the whole group sat down together in order to read through and improve the claims in each application. This part of the process was a very good training in patent matters and also improved the formulation of the claims (according to the patent engineers).

During the process we learnt about the time frame of the patenting process as well as strategic issues. One such issue relates to the differences in the European and the American regulations about patents. Another one was about the importance of being first and not to tell anyone. The latter issue is somewhat contradictory to the everyday research as we knew it. The publication problem was discussed over and over again,

but not all were convinced that patenting scientific ideas is a good thing. Especially if an invention comes out of a Ph.D. project and the Ph.D. student is more than half ways to the Ph.D., it is questionable if waiting for 18 months with publishing is possible. All agreed that this was an important issue, but no consensus was found on how to handle it.

Seen in retrospective, none of us researchers were much of an entrepreneur. This means that none of the inventors seemed to be very interested in basing a business on these ideas. “I don’t want to start my own company” was the general attitude. Maybe the reason is that we did not beforehand realise the strong commercial focus of patents. This was at least suggested by one researcher in the evaluation. Without Mats Leijon and the patent engineers, no patent applications would have been filed. However, the evaluation showed that all researchers involved in the project will consider patenting next time they get an idea with commercial interest.

What was good:

- It was very inspiring to learn to think so differently.
- The enthusiasm of Mats Leijon was really contagious!
- The way we helped each other with the patent claims (all inventors plus patent engineers and Mats Leijon) enhanced the understanding of the process as well as improved the patent applications.

Things to change if the workshop would take place once more:

- Use the first meeting to lecture about the patenting process (time frames etc) and present some real claims as an example of what it can look like and try to get the researchers used to the thinking. In this way everyone would be better prepared for the phase where a number of ideas are brought up as patentable, and the ideas could get more powerful.
- A discussion is needed about how patenting an idea would affect the other parts of the work as a researcher, i.e. research, education and the publishing of results.
- Some kind of plan for “afterwards” is needed. When all applications were filed, everything died out and there was no money to go for an international application - if desired.

Conclusion

This project clearly enhanced the possibilities to patenting ideas from the research projects. In order to get more patents out of the university there is a need for this type of “hands-on” view of what patenting is, as well as education in the patenting process and strategies. However, only theoretical knowledge about patents and strategies is not enough! Learning by doing is by far the best way. According to the evaluation, some of us knew both about patents and the support available at Chalmers already before that first meeting, but *never thought of the possibility* in the everyday research work. Maybe, it was a lack of entrepreneurship that caused us to ignore these ideas as patentable until we met Mats Leijon, who widened our perspective of our own ideas.

Details about filing dates and names can be found in the evaluation report from the project in A.15. Of the originally six ideas, five were filed.

(Written by Karin Glasmästar, one of the researchers participating in the project)

Patent project Evaluation report

1 Background

The Strategy for the Foundation for Strategic Research (SSF) reads:

“Under the terms of its statutes, the Foundation is to promote the development of vigorous research environments of the highest international class and of importance for the development of Sweden's future competitiveness. By strategic research is meant research that is judged to be of long-term benefit to Sweden. The Foundation judges benefit from one or more of the following aspects.

- *The power of internationally first-class research environments to attract unique competence and international investment to this country*
- *People with graduate degrees who through broadened and improved research training are attractive for appointments primarily within industry and the administration, but also at universities*
- *Research results that may form the basis for the development of existing or new enterprises*
- *Increased quality of life through more employment opportunities, improved working conditions and improved health*
- *Research that acts as a focus for international co-operation through which knowledge of relevance to Swedish industry may be brought into the country”*

One consequence of this strategy is that patent issues should be in focus in the programmes financed by SSF. Therefore, the Program Director and the Board for the four SSF programs “Biocompatible Materials”, “Molecular Engineering in Polymer Science”, “Graduate School in Materials Science” and “High Performance Outdoor Electrical Insulation (ELIS)” has continuously encouraged the Project Leaders in these programs to identify patentable ideas and to write and submit patents.

2 The Patent Project

During last year a special effort was made to educate the researchers to judge patentability of inventions and to write patents. The work was organised in the form of a project (the Patent Project), where Mats Leijon, member of the Board and highly recognised as a patent expert, was engaged as Project Leader. Researchers from the research projects participated in the work, and as a result five patents have been submitted. Four professional patent engineers were engaged to discuss the ideas with the researchers and to write the patents.

The first step was a “brain storming” meeting where a number of ideas were scrutinised. At this meeting, lead by Mats, only researchers participated. Six ideas were selected for further processing. Also, at this meeting a time schedule was established for the patent process.

The second step was to engage four patent engineers and to go through the ideas with them. The ideas were distributed among the patent engineers, and a closer contact established between them

and the responsible researchers. Considerable time was spent to discuss formal issues, and especially strategic issues, regarding the transfer from ideas to patents. The third step was performed when the patents had been formulated, and the main purpose was to discuss and scrutinise the claims. This was done in a forum comprising all researchers and all patent engineers.

3 Patents submitted

- 00-12-21 (Ann-Sofie Andersson, Karin Glasmäster, Per Hanarp, Duncan Sutherland)
”Förfarande för ytmodifiering” (inlämnad i Sverige)
- 00-12-21 (Karin Glasmäster, Ann-Sofie Andersson, Per Hanarp, Duncan Sutherland)
”Förfarande och anordning vid ytmodifiering” (inlämnad i Sverige)
- 00-12-21 (Bengt Kasemo, Igor Zoric, Håkan Rapp)
”Sensor” (inlämnad i Sverige)
- 00-12-21 (Fredrik Höök, Duncan Sutherland, Mikael Käll)
”Sensor samt förfarande för att framställa sådan” (inlämnad i Sverige)
- 01-02-23 (Julie Gold, Sarunas Petronis, Ann Wennerberg)
”Biomedical device” (inlämnad i Storbritannien)

At this stage each patent represents a cost of approximately 50 kSEK.

4 Evaluation

The main purpose with the Patent Project was to educate the researchers in the different aspects of the patent process. Therefore the researchers, and also the patent engineers, were asked to answer some questions, in order to make it possible for the Board and other interested parties to make an evaluation of cost vs benefit of this effort.

Seven researchers and three patent engineers responded to questions, and their answers are given explicitly below.

Questions for the researchers:

- 1 At the first meeting in the Patent project, six ideas were identified for further processing. Did you expect that we would have come up with that many patentable ideas?

No

I had no expectations on the number of patent ideas.

We still do not know whether they are patentable, since the ideas have not been approved by the patent office.

On the other hand I did not expect that many ideas to come up at all. I was surprised that Mats was so enthusiastic by our ideas and that he could see commercial values in all the ideas. I was also surprised that he could follow our ideas and understand them at all.

No

Yes (but see point 10)

Nej

No

- 2 Have you participated in any patent writing before the Patent project?

No

No, but I followed a 2-day course about patents a couple of years ago.

No!

No

No

Nej

No

- 3 Did you find it difficult to understand the formal issues regarding the patent process? If so, exemplify!

I was not present at the first meeting so I may have missed some vital information, but: I still do not feel I understand all I will need to know concerning the formal issues. In particular it is not clear whether/how it is possible to publish articles at the same time as submitting patents. There was no clear information as to the formal 'rules'. (i.e. what are the consequences of publishing at various points during the patent submission process).

No

Yes it is difficult.

The language is different and difficult.

It is hard to understand what is meant by "new" and when it can be published and not be published.

A patent can include parts which is not proven but can by logic be seen or has the potential to work. This is in contrast with scientific work where everything has to be proven.

I did not know that there is so much “politics” in patent writing. That you play with words and that a whole patent can be worthless if you write it in a way so that others can find “holes”. You have to include everything and be smart!

No

I’m still not really sure about what the different submission dates mean? Also how much you are able to change/move/delete after the first submission?

Nej

Yes; Patentkravens utformning. The words “kännetecknad av” were confusing.

- 4 Did you find it difficult to understand the commercial/strategic issues regarding the patent process? If so, exemplify!

I have difficulty to understand parts of the strategic issues. I do not feel I have a good grip of the international aspects. i.e. what are the benefits from patenting first in sweden (rather than starting in europe). I am not clear what the pros/cons are of patenting first or last in the USA.

No to understand them, but it was hard to start thinking along those lines.

Yes it is difficult.

The expertise I have in commercial issues is little so in the aspect of making money on patents I am lost.

On the other hand, during the process, we all started to think in fields were our ideas could potentially be commercial used.

I still don’t understand these issues as pertains to our patents – ie this patent project

No (now I realise that the commercial interests are the most important, see point 10)

Nej, däremot var en hel del förvånande. Vad jag tycker är oklart är vilken strategi man ska välja för att bäst skydda sig på de viktigaste marknaderna utan att dra på sig för stora kostnader (när man inte har så mycket pengar till sitt förfogande). T ex vilka marknader man först bör täcka och varför just dem.

No, but I was not aware of the commercial aspects (I was only interested in patenting the idea).

- 5 Approximately, how much time (hours) have you spent till now on the patent project (meetings, patent and literature search, discussions with the patent engineers etc)?

Approx. 35 hours

36 hours (8 hours of which would have been used for literature search anyway)

Two full days (16 hours) + approximately 19 hr = 35 hours

Ca 25 hours

50

~20 (Jag är inte ansvarig för något av projekten.)

~1 week; maybe a little bit more

- 6 Have you, before the Patent project, discussed patent issues with any official person at Chalmers?

No

No

No

No

No

Nej

Yes (with Beng K)

- 7 Is there a need for continuous support regarding patent issues, at Chalmers or arranged by someone else?

Yes

Yes. In order to make researchers understand that the only way to make their research of interest to a company is to have a patent on the idea, there is need for support. I think the support should be in the form of education in patent issues and in thinking in terms of patents. There should also be a possibility to get the patent process financed through stipends or similar. I don't think it matters where the money comes from as long as the donors don't claim to own the patent if it comes through. The way this project was run worked fine for as small a group as we were. It would be hard to deal with a larger group in the same way.

Yes, but I know that we have possibilities to get help if we need some at Chalmers. (e.g. Chalmers Innovation)

Yes, this type of workshop is very effective. Of course it helps that we don't have to pay anything.

Yes

Ja, absolut!

?

- 8 Have your participation in the Patent project made you more interested in commercial issues regarding your research?

Yes

Yes, or at least more aware of the potential of the commercial interest as a means of making the research 'useful' in a broader sense.

Maybe a little bit, but there is no time for it in our daily work.

Not necessarily, since I cannot see what might happen beyond the writing and submission of the patent.

No

Absolut! Framför allt var det givande att se hur det gick att forma patentidéer ur ganska vaga forskningsidéer. Det är svårt att sätta sig i det mindset som behövs för att inse den kommersiella potentialen i de idéer man har. Mer sådan hjälp! jag är definitivt intresserad.

Yes (but not much)

- 9 Next time you get an idea you believe is of commercial interest, will you write a patent?

I will consider it. It will depend on how it would effect my research.

Yes, if I manage to finance the process.

Maybe, if someone gives me the money to pay for the costs for the patent process.

Yes, if I can find the money to pay for it.

In the future: Yes.

Right now, beeing a PhD student, I'm not really in this for the money: No.

Ja, det vill jag om möjligheten finns.

Yes

- 10 Do you have any other comments you believe can be of any help in the evaluation of the Patent project?

I think that there is something missing from the patent project which must be addressed in any future project. As an academic we have a number of roles to fulfill to justify our funding. We must be involved in research, in education and to an increasing extent be involved with the commercial aspect of the research. I as a researcher come to the patent project with a set of beliefs and fears about patents. In particular I am very concerned with how patenting an idea will effect the other parts of my job (research and education). I assume that one of the goals of the patent project is to lead to inclusion of patenting in the everyday lives of the participants (if not actually patenting then at least giving a thought to the possibilities). So for me a vital part of an education concerning patents is information on how patenting will affect the existing parts of my life and how I can change those parts of optimise the whole. I felt this was very much lacking from the patent project. The project seemed mostly concerned with how to patent in an industrial environment (divorced from the needs of academic research excellence and education), and not patenting in an academic environment. To be much more specific we were told that we should have a publication silence for 18 months after submitting a patent. Any attempt to discuss the relation of this point with respect to academic research was bypassed, with statements that 18 months is not a problem for academics and that it would all be fixed later. These statements were unhelpful and I am left with the feeling that it is a problem which is not recognised nor appreciated by the course leaders and that no solution actually exists. For an academic all aspects of our job must be reconciled and this is a key issue about which I need more education. Probably there are strategies and approaches to optimise both the patent issues and the issues of academic research and education. I would like to have been informed of these strategies/approaches rather than be told what works best in a company environment (e.g. that I must have an 18 month publication silence). I must say however that I have benefited enormously from the patent project, I do feel though that I could have benefited more if the course plan was formulated from the perspective of patenting in an academic environment.

It would have been good to have a first meeting with a more 'brain storming' character. Our first meeting with Mats was more like a presentation of ideas that were more or less fixed. I think we could come up with other powerful ideas if we had discussed it beforehand. It took some time to get used to the new way of thinking: 'you don't have to prove anything, it just has to be possible'.

I also believe that the conflict between scientific publication and keeping quiet in order to get a strong patent needs to be further discussed. The problem arises for example when the idea to be patented is the basis for the whole project or part of the main track and the PhD student only has two years or less left of the studies.

*The project was fun and by me taken as a learning process. A lot more is learned this way than when you take a day course in "immaterial rätt". Learning by doing!
The leader Mats was a great resource in order to give us inspiration and realize that patents can be fun.*

There was little information about what the (first) meeting was going to be about before it happened. We had no idea that it would be a series of meetings, or that we would be writing patents. The whole thing occurred kind of “by surprise”. I think if there was more information about what we were going to do, we would have been able to spend time in advance thinking of patent ideas and searching for patents before the first meeting.

a) To possibly get even better ideas, I would suggest that the first meeting (where we discussed i) patent strategy in general and then ii) identified patent ideas) should be split into two days with a week in between (first i and then ii). It would have helped to roughly know what a patent idea could be before formulating our own ideas...

b) Also I did not realise the strong commercial focus on patents beforehand. Some of the ideas were perhaps more of scientific interest than truly commercially viable.

c) I have learned A LOT on this course. Great thanks to the organisers.

It is important to be well prepared → less changes during the patent process → better patent

Questions for the patent engineers:

- 1 In the Patent project, six ideas were identified for further processing. Did you expect that the group would have come up with that many patentable ideas?

I find it difficult to have an opinion on this topic since I have very limited insight into the underlying research resulting in the ideas in question. As patent engineer I did not come on the scene until the identification of ideas was terminated.

No, because often the researchers/inventors underestimate their ideas and do not believe that they are really patentable.

Since I did not know anything about the background of the project I had no particular expectation in that respect.

- 2 Was your interaction with the researchers as efficient as with industrial inventors?

Parts of our meetings were “in plenum” for discussing matters of general nature and claim drafts. Such meetings in plenum you normally don’t have when working with industrial inventors and they increased somewhat the total time needed for preparing the applications. However, as far as I understand, the main purpose of these plenum meetings were to give the inventors a training in patent matters. According to my experience from other in plenum discussions of claim drafts, the formulation of the claims often is actually improved as a result of such discussions.

The direct cooperation with the inventors was definitely as efficient as the cooperation with industrial inventors ever can be. Complementary informations and answers to my questions were complete and delivered very quickly, worthy of imitation.

To interact with a group of researchers/inventors as in this case might not be so efficient (and quick) compared to industry, where the interaction is most often with one individual inventor (or representative). On the other hand the interaction with the well-qualified group of researcher probably resulted in a more carefully prepared application text.

The efficiency when co-operating with industrial inventors varies considerably. The efficiency of the interaction in this case was in the middle of that range.

3 Was it difficult to understand the ideas?

No

Yes, at least in the beginning.

Yes, mainly depending on my lack of background knowledge in the technical field in question.

4 Do you have any other comments you believe can be of any help in the evaluation of the Patent project?

Maybe this is not an answer to your question (help in the evaluation of the Project), anyhow, for inventors without any experience at all of applying for patent it could be of value to get a (short) lecture on the practical procedure when preparing a patent application (and perhaps about the continued prosecution of the application), before the actual work with preparing the application starts.

Additional elements of evaluation will of course be obtained in the future, viz. will patents be obtained for the ideas in question and will the ideas be commercialized.

A question to the researchers is if they find application for patent to be in serious conflict with their desire to publish their scientific results.

Another question to the researchers could be: Would they have tried to protect their ideas by patent, or would they ever have thought of this possibility, on their own initiative, without such a patent project?

The common discussion of the patent claims, and the following "expansion" of the claims, was a valuable part of the patent project.

It is quite natural that the ideas from the researchers are more theoretical. But now when these ideas have been filed one should look for some more detailed examples, preferred embodiments, practical/commercial devices to add.

A further important part of the patent project would be to look into the examination report from the patent office and discuss how to distinguish from cited prior art.

Regarding the evaluation, I can see two different aspects thereof. One is the educational process, i.e. how the project raises the consciousness and knowledge about patenting. The other is the patenting of the ideas. It might be useful to separate these two aspects when evaluating.

I have also some general comments on the project.

I have the impression that it was successful, well organised and that much was achieved considering that it was a project starting from scratch. This I believe is much to the thanks of Mats who was an enthusiastic and pedagogic bridge between the researches and the patent experts. The learning-by-doing-approach where education was mixed with real cases, I think was an excellent tool in a project like this.

The concept, however could be still improved. I think it would be valuable to during the meetings have one or more short(15-30 min) lectures by the patent experts giving introduction to the main patent issues closely related to the patenting process. It would also be an advantage if the participants in advance could have a detailed agenda and some written material about certain aspects of patenting that are going to be dealt with during the meeting. Correspondingly the efficiency of the information transfer from the inventor to the patent expert could be improved. Thus, it would be very useful if the patent expert could have a written presentation of the invention before the meeting. The oral discussion then would be much more efficient.

In the education of the researcher s in my opinion, the most important issues are:

- 1. How should an invention be presented to the patent expert that will write the application*
- 2. What are the functions of the brick-stones in a patent application regarding patentability, scope of protection and enablement.*

5 Conclusion

The researchers comprised a group with very little experience from the patent process, and it is very interesting to notice that they were in general very surprised that so many patentable ideas came up at the first meeting.

It is obvious that the formal issues as well as the strategic issues of the patent process need to be addressed in a systematic and organised way, where people with experience from the patent process can share their knowledge with the “beginners”. The researchers need help to penetrate into the world of patents.

Therefore, there is a need for patent offices at the universities, to give the necessary professional support to researchers who wants to patent ideas. Also, there is a need for financial support, since already the very first stage in the patent process represents a major investment from a private point of view.



**VINNOVA och Stiftelsen för Strategisk Forskning
arrangerar **2002 ÅRS
MEDICINTEKNISKA
KONFERENS****

**Huddinge Universitetsområde
8–9 oktober 2002**

VÄRDAR

**södertörns
högskola**

UNIVERSITY COLLEGE



Stiftelsen för Strategisk Forskning

SAMARBETSPARTNERS

SILF NUTEK

**HUDDINGE
UNIVERSITETSSJUKHUS**



Konferensens syfte är att vara en mötesplats där aktörer inom området medicinsk teknik kan knyta kontakter mellan forskning, näringsliv och hälso- och sjukvården. På programmet står både presentationer av FoU-projekt, framtidsfrågor, regionala satsningar och aktuella teman samt demonstrationer och föreläsningar.

Onsdag den 9 oktober

Programmet uppdateras löpande på www.vinnova.se ("Kalendarium") och www.stratresearch.se ("Medicinteknisk konferens")		
08:45	<p>Session A: SSF Research Programme "Biocompatible Materials". First public presentation of programme results 1996–2001 Lokal: Aula (Alt Hörsal)</p> <p>Optimal surface topography for bone-anchored implants. Introduction by <i>Ann Wennerberg</i>, Göteborgs Universitet</p> <p>On the bone response to different implant textures. <i>Carin Hallgren Höstner</i>.</p> <p>Laser micropatterning of medical implants. <i>Henrik Reimers</i>, both Göteborgs Universitet</p> <p>Biomembranes. <i>Karin Glasmästar</i>, Göteborgs Universitet och Chalmers</p> <p>Future challenges and directions. Concluding discussion. <i>Programme and project leaders and guests</i></p>	<p>Session B: Medicinsk Teknik i vården Lokal: Aula (Alt Hörsal)</p> <p>FoU-presentationer "Sensorer" Moderator: <i>Håkan Elmqvist</i>, Karolinska Institutet</p> <p>En tunn multifunktionskateter för intrakardiella och intravaskulära tryck- och volyms-mätningar. <i>Emil Söderqvist</i> Karolinska Institutet</p> <p>Microneedles for Medical and Biochemical Interfaces. <i>Patrick Griss</i> KTH</p> <p>Mikroelektroarrayer för mätning av signaler i nervvävnad. <i>Maria Kindlundh</i> Acreo AB</p> <p>Tryckmätningar i mellankotskivor. <i>Soante Höjer</i> Samba Sensors AB</p>
10:30	Paus	
10:40	<p>Session C: Biomaterial VINNOVA</p> <p>Moderator: <i>Staffan Sjödin</i>, SBS AB</p> <p>Biokompatibilitetsmodeller som underlag för industriella beslutsprocesser. <i>Håkan Nygren</i>, Göteborgs Universitet</p> <p>Peritonit och peritonealdialysvätskor. <i>Magnus Braide</i></p> <p>Särgeler som motverkar lipidperoxidation. <i>Herman Sahlin</i></p> <p>Proteomik för påvisande av inflammations-mediators. <i>Per Malmberg</i>, Göteborgs Universitet</p>	<p>Säkerhetsfrågor vid utformning och användning av medicinteknisk utrustning</p> <p>Moderator: <i>Heikki Teriö</i>, Huddinge Sjukhus</p> <p>Att hantera osäkerhet. Kunskap, organisation och komplex teknik i intensivvården. <i>Sabrina Thelander</i> Tema Teknik och social förändring Linköpings Universitet</p> <p>Hanteringssäker medicinteknisk utrustning. <i>Anna-Lisa Osvalder</i> Avd. för Människa-tekniksystem (HFE) Inst. för Produkt- och Produktionsutveckling CTH</p>
11:40	Lunch, Södertörns Högskola	
12:40	<p>Material surface modification and biological respons. <i>Peter Thomsen</i>, Göteborgs Universitet</p> <p>Tidig benbildning på implantatytor. <i>Cecilia Eriksson</i>, Göteborgs Universitet</p> <p>Fysiska ben- och vävnadsmodeller – ett stort steg för kirurgin. <i>Hans von Holst</i>, KTH/KS</p> <p>Direkt tillverkning av implantat? <i>Lars Avellan</i> IVF</p>	<p>FoU presentationer "Visualisering" Moderator: <i>Hans Knutsson</i>, Linköpings Universitet</p> <p>Compact X-Ray Microscopy Inst för biomedicinsk fysik och röntgenfysik. <i>Heide Stollberg</i> KTH/SCFAB</p> <p>Automatic identification and classification of Cytomegalovirus capsids in electron micrographs. <i>Ida-Maria Sintorn</i> CBA/Uppsala Universitet</p> <p>Tactile Video. <i>Li Liu</i> Umeå Universitet</p> <p>Imaging Brain Function. <i>Ola Friman</i> Linköpings Universitet</p>
14:10	Paus	
14:20	Visioner	
	<p>Ett tvärvetenskapligt panorama med utsikter och insikter inom medicinsk teknik, molekylär diagnostik, tissue engineering m.m. <i>Gert Nilsson</i>, Linköpings Universitet, <i>Eva Pisa</i>, Sangtec Molecular Diagnostics AB och <i>Julie Gold</i>, Chalmers</p>	
15:00	Finansieringsfrågor och Gemensam avslutning	



VINNOVA's uppgift är att främja **hållbar tillväxt** genom utveckling av **effektiva innovationssystem** och finansiering av **behovsmotiverad forskning**.

VINNOVA

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A.17 Economic report - numbers

Final economic report, form 1 for the SSF-programme "Biocompatible materials"

Summary of annual reports

Income	Year	1996	1997	1998	1999	2000	2001	2002	2003	Total
Grants from SSF			10000		9500	8000	7500	3000	8000	46000
Other grants									0	0
Deduction: VAT									0	0
Other income										0
Total income		0	10000	0	9500	8000	7500	3000	8000	46000
Costs										
Project grants (specified on form 2)			2400	5470	5750	6850	6925	3681	3475	34551
Other costs (specified on form 3)			1432	1332	1232	1232	1574	323	1379	8504
Total costs		0	3832	6802	6982	8082	8499	4004	4854	43055
Annual result		0	6168	-6802	2518	-82	-999	-1004	3146	
Accumulated result		0	6168	-634	1884	1802	803	-201	3146	2945

Final economic report, form 2 for the SSF-programme "Biocompatible materials"


Project grants

University	Department	Project leader	SEK paid in										Total
			1996	1997	1998	1999	2000	2001	2002	2003			
Göteborgs Universitet	Biomaterial/Handikappforskning	Ann Wennerberg		700	1200	1200	1200	1200	1200	1100	600		6000
Chalmers	Tillämpad fysik	Ann-Sofie Andersson			900	2000	2100	381					5381
Chalmers	Tillämpad fysik	Julie Gold		700	1200	1200	1100	2100					7500
Uppsala Universitet	Klinisk immunologi	Rolf Larsson		500	900	900	900	600				401	5101,4
Lunds Universitet	Avd för ortopedi	Lars Lidgren			1800	1300	1500						5900
Göteborgs Universitet	Allmän och marin mikrobiologi	Hans Elwing		200	200	250	225						1125
Göteborgs Universitet	Anatomi och cellbiologi	Håkan Nygren			170								170
Göteborgs Universitet	Anatomi och cellbiologi	Peter Thomsen		300									300
Lunds Univ	Kirurgiska kliniken	Lars-Magnus Bjursten										168	168
Chalmers/Lunds Univ	Tillämpad fysik/Kirurgiska kliniken	J Gold/L-M Bjursten										1340	1340
Rensselaer Polytechnic Inst	Biomedical Engineering	Rena Bizios										110	110
Biacore		Stefan Lövä										325	325
Uppsala Universitet		Jöns Hilborn										271	271
Cranrec		Lennart Carlsson										290	290
Carmeda AB		Helena Franzén										130	130
St Jude Medical AB		Susanne Nilsson										140	140
Uppsala Universitet		Karin Caldwell										300	300
Total			0	2 400	5 470	5 750	6 850	6 925	3 681	3 475	34551,4		

Final economic report, form 3
for the SSF-programme "Biocompatible materials"

Cost apart from projectcosts

	SEK paid in 1996	1997	1998	1999	2000	2001	2002	2003	Total
PhD costs									0
Courses									0
Research costs		280	300	300	300	376	323	153	2032
Outreach									0
Administration costs		920	800	700	700	966		994	5080
Over-head		232	232	232	232	232		232	1392
Other costs									0
Grand total	0	1 432	1 332	1 232	1 232	1 574	323	1 379	8504



An inventory of today's most commonly used biomaterials shows that the chosen materials are in fact rather conventional materials, which were originally developed for other applications than biological and medical ones. There exist today only a few "dedicated" biomaterials that have been specifically and intentionally developed for clinical applications. One of the main goals of biomaterials research is to develop a new generation of functional biomaterials, which are designed to produce a biological response that is optimal for the intended clinical application.

From a scientific point of view, the biomaterials field is still relatively immature. Biomaterials research is extremely multidisciplinary, including disciplines such as the clinical sciences, laboratory medicine, anatomy, immunology, cell biology, molecular biology, mechanical engineering, materials science, chemistry, and physics. Also, the development of a deeper understanding of the mechanisms that are responsible for the complicated interaction between biological tissue and artificial materials, have made the biomaterials research area come closer to a number of applications that earlier were considered as completely separate, like for example electronics and sensors.

