EPSRC

Engineering and Physical Sciences Research Council

Synthetic Chemistry Studentship Research Review Event

27th and 28th June 2007

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Contents

Executive Summary

The Synthetic Chemistry Studentship Review event was held on 27th and 28th June at Jury's Inn Hotel, Birmingham. A Panel of experts was invited to evaluate a portfolio of studentships selected from the areas of asymmetric chemistry, carbohydrate chemistry, chemical synthetic methodology, combinatorial chemistry and co-ordination chemistry. EPSRC studentships show-cased at the event included those funded through Doctoral Training Grants, Project Studentships and Industrial CASE. Supervisors were asked to prepare a synopsis of their research prior to the review event and to prepare a poster to present to the Panel on the day, for discussion.

The Panel was asked to consider the following issues when evaluating grants: key contributions to the field; factors aiding or limiting achievement; duplication with other research; technology transfer/exploitation and other types of follow-on activities; research outputs in terms of papers, patents etc.; interaction with other fields of research; production of new research avenues/products/processes; and quality of training of research staff.

The following broad conclusions were reached:

- The overall quality of the research was internationally competitive and a significant proportion of grants were found to be internationally leading; there was an impressive publication output by some studentship projects. Of the 77 studentship projects 78% delivered some publications; 27% delivered more than four publications, with one project delivering 17 papers from one studentship.
- The studentship portfolio contained multidisciplinary research with many projects outreaching to other research areas;
- The portfolio demonstrated a healthy balance between exciting new areas of research and more established areas;
- DTA studentships in synthetic chemistry are being used for very speculative, adventurous and ambitious research – the flexible nature of the studentships allows risky ideas to be tried. Many of the most successful, innovative research projects are started as a result of work tried out by studentships.
- New collaborations developed as part of the studentship project; either with other academics across traditional boundaries - within universities or internationally, although some were with industry. The studentship projects allowed collaborations to develop with life scientists or chemical engineers, for example. These collaborations were not always in place at the start of the project, but evolved as it went on.
- The theme day format was well supported by the panel. It was thought that interviewing the supervisors, with the aid of a poster supplied by the academics resulted in a two way dialogue, and yielded far more realistic information than the academics sending in a pro-forma alone. The timescale selected, of students having finished in the last two years, was thought to be effective.
- The high level of industrial engagement in the studentships appears to be a strength of the synthetic community, due to the close relationship with the pharmaceutical industry, where student support is perceived differently from many other industry areas. It would appear that there is not a high expectancy of direct benefit through the project to the industrial funder, but more about the supporting of academics and the contribution to the skill base in the area through the training provided. 30/77 (39%) studentship projects involved industrial collaboration.

- The panel considered that the size of the sample of studentships at the event was representative of the whole; and not just a selection of the very best studentships.
- The panel was very supportive of the value of the DTA funding mechanism. They thought the review event demonstrated the quality, creativity and adventure of the projects funded by it; and felt strongly that the level of funding should be maintained.
- The community were also keen to emphasise the value of the DTA funding mechanism; one quoting “DTA is the best value mechanism for funding UK research and investing in the future of UK scientists”.
- A high proportion of the students found subsequent employment in industry after their PhD. 39/77 (51%) went into careers in industry.

Acknowledgements

The EPSRC would like to thank the following people for making the Synthetic Chemistry Studentship Review Day a success:

- Dr Peter Machin, for chairing the evaluation panel.
- The evaluation panel members for their hard work before, during and after the Review event.
- The supervisors for taking the time to attend the Review event and present their work to the evaluation panel.
- Prof Erick Carreira and Prof Annie Powell, for their interesting plenary talks.

1. Introduction

The objective of the review event was to evaluate the research carried out by studentships in Synthetic Chemistry. The EPSRC Chemistry Programme funds the highest number of studentships of any of the science programmes and this event was also an opportunity to showcase the research carried out. EPSRC support for studentships is delivered through a number of mechanisms primarily either through project studentships or the Doctoral Training accounts. Project studentships are associated with a research grant while Doctoral Training Grants (DTGs) are delivered as a "block" grant to the University to support training. In practice an individual student would not discern a difference however they were funded, with both contributing to research activity. The review event focused not only on the quality of science delivered, but also the quality and effectiveness of the training, and the knowledge transfer and exploitation of the research by others. The format chosen for the evaluation was that of a discipline theme day. As such, the methodology behind the event was intended to complement that of the individual programme evaluation exercise.

A panel of experts reviewed a representative portfolio of studentships supported on grants (Project Studentships), Industrial CASE and DTG. Following the event, the report will be an input to advise the EPSRC on future strategy in this research area. Each project within the portfolio was reviewed by the panel, using the following three criteria:

Research – Quality and scientific impact

Training – Quality and effectiveness; output of trained people.

Knowledge Transfer– the potential for the research to contribute to (UK) wealth creation and quality of life through new or improved products, processes and services

This report is based upon the panel's discussions with supervisors. The report will also be made available on the EPSRC website.

2. Background

The studentship review in synthetic chemistry was organised for a number of reasons:

1. To evaluate the quality and scientific impact of the research carried out by the studentships that the EPSRC has funded through a number of mechanisms, namely grants, DTG and Industrial CASE.
2. To highlight that chemistry PhD students are not simply receiving training but also in the majority of cases delivering internationally leading research.
3. To enable supervisors to showcase their research and network with other researchers.

The areas chosen to highlight were broadly under the theme of synthetic chemistry, specifically; asymmetric chemistry, chemical synthetic methodology, carbohydrate chemistry, co-ordination chemistry and combinatorial chemistry. The number of EPSRC studentships within this theme that commenced in the financial years 2001/2002 and 2002/2003 were 364. These financial years were chosen as the students would have all finished within the same timescale and relatively recently for ease of reviewing the projects.

From the total sample, 129 studentship projects were invited, on a pro-rata basis from each university. Each university was supplied with a list of their studentships from the two financial years and allowed to select their allocation from this list- semi selectively. A total of 77 responded and attended. (21% of the sample)

Of the attendees there were 54 DTA studentships, 17 Project studentships and 11 Industrial CASE studentships.

3. Methodology

3.1 Panel Membership

Panel members were selected to give a representative coverage of the areas, taking into account independent and industrial expertise. Efforts were taken to ensure that conflicts of interest were minimised and that a balance was drawn between specific expertise and broad experience. The Panel members were:

Dr Peter Machin(Chair)	Consultant
Prof Peter Styring	University of Sheffield
Prof Ben Davis	University of Oxford
Prof Annie Powell	University of Karlsruhe
Prof Peter Scott	University of Warwick
Prof Uday Maitra	ITSc Bangalore
Prof D Graham	University of Strathclyde

3.2 Selection of the Studentship Portfolio

The studentships evaluated were drawn from the three primary EPSRC mechanisms for PhD funding. The three mechanisms are:

Project studentships
These studentships are associated with standard EPSRC research grants. Such grants can be solely for the studentship or part of a larger programme of work.

Doctoral Training Grant

A doctoral training grant provides the finance associated with each cohort of students starting their doctoral training programmes, usually from October onwards. Universities are able to decide on the level of stipend (at or above the national minimum); the project duration (up to 4 years full time support); the format (e.g. part-time, industrial placement), and to adjust the number and timing of awards within year and between years. Decisions on stipend and project duration can be balanced with considerations of the discipline, location and overall student numbers.

Industrial CASE

Through Industrial CASE, a number of studentships are allocated to companies. The companies can then choose the academic partner which hosts the Industrial CASE student.

Once the academic partner has been selected and the arrangements for the project have been agreed between the company and university, the student can be recruited. The same student eligibility requirements and terms and conditions apply as for other EPSRC students.

Companies must provide a minimum level of contributions to the student and academic department. These are detailed in the Industrial CASE Training Grant conditions.

3.3 The Meeting Process

Over the two days of the review meeting, the panel reviewed 77 posters, from an initial invitation list of 129 projects. (All projects were from the financial years 2001/2002; 2003/2003). The invited projects were identified from the data collated on research grants and Doctoral Training Awards. Several of the supervisors presented work from more than one EPSRC funded student that had been involved with the selected project.
In total, 81 individual project analysis cards were used in the final data analysis (4 invitees were not able to attend).

Prior to the review event each grant holder was asked to complete a synopsis (a blank copy is shown in Appendix C) describing their project in the context of the Research, Training and Knowledge Transfer framework. These synopses were circulated to the Panel a fortnight before the Review itself.

Members of the Panel were sent briefing material prior to this review event. Any final points of clarification were discussed at the initial panel meeting prior to the review event; the areas covered by this meeting were:

- The purpose of the Review Event
- The remit of the evaluation
- The role of the Panel
- Information for the Panel and expected outputs
- The structure of the day
- The Research, Training and Knowledge Transfer criteria

- Panel member allocation to grants
- The post-meeting of the Panel

The Review Days was held on Wednesday 27th and Thursday 28th June 2007 (timetable attached at Appendix E) and included:

- An introduction from John Baird, the Head of the Chemistry Programme and the Panel Chair Dr Peter Machin
- invited plenary presentations by Prof Erick Carreira – ETH Zurich, and Prof Annie Powell, University of Karlsruhe.
- There were "surgery" discussion sessions that attendees could book with EPSRC staff whilst their poster was not being reviewed
- A presentation by Dr Alasdair Rose, EPSRC, on future plans at EPSRC.

Grant holders were pre-assigned a time to present their poster. There was also the opportunity to network with other grant holders and have discussions with EPSRC staff.

Following the Review Event, the scores for all contributions were aggregated to provide scores for Research, Training and Knowledge Transfer for the Synthetic Chemistry theme as a whole. Details of these can be found at Appendix A.

4. Summary of the Evaluation

4.1 General Comments

On the basis of the synopses, posters and discussions with the grant holders the Panel completed 77 individual analysis cards including Research, Training and Knowledge Transfer scores. These criteria had been discussed at the pre-meeting of the Panel.

The panel observed that the overall research quality of the projects was high, and the poster discussions were more informative about forming this view than the proformas alone.

The publication output was impressive with some studentships – 17 papers were produced from one project for example- there were many publications presented in high quality journals such as Nature, J.Am.Chem.Soc., Angew.Chem. and Chem Comm.

60/77 studentships delivered some publications; while 21/77 studentships delivered > 4 publications.

The quality of science produced by the DTA studentships was observed to be high; often innovative and competitive internationally. Although these projects are not peer reviewed, they usually have to be approved by the departmental research committee at the University. The opinion of the panel was that there was no distinction of quality between the studentships from different funding

mechanisms; and influencing factors are often the working environment including post-doctoral support.

The posters demonstrated that the contribution Chemistry PhD students make to the research base is vital and that they were not simply receiving training.

The panel observed that the quality of student training was good, but there were exemplars of, for example, students preparing papers; many students were involved in writing the first draft of proposals. Some students had the valuable experience of travelling to the United States to learn a new technique, for example.

It was observed from discussing the poster presentations with regard to knowledge transfer that 39% of the studentship projects contained industrial collaboration. This observation is significant as on project studentships awarded through the grant mechanism, 14% of these are measured to have industrial collaborators.

The panel concluded that DTA studentships in synthetic chemistry are being used for very speculative, adventurous and ambitious research – the flexible nature of the studentships allows risky ideas to be tried. The most successful, innovative research projects are often started as a result of work tried out by studentships, and carried on by postdoctoral researchers who bring more skills and wider experience to bear.

New collaborations developed as part of the studentship project; either with other academics across traditional boundaries - within universities or internationally, although some were with industry. The studentship projects allowed collaborations to develop with life scientists or chemical engineers, for example. These collaborations were not always in place at the start of the project, but evolved as it went on.

The theme day format was well supported by the panel. It was thought that interviewing the supervisors, with the aid of a poster supplied by the academics resulted in a 2 way dialogue, and yielded far more realistic information than the academics sending in a pro-forma alone. The timescale selected, of students having finished in the last 2 years, was thought to be effective.

The analysis and discussions showed that 50% of the students went on to careers in industry after their PhD.

4.2 Analysis Scores

Scheme	DTA	CASE	Project Student
Research Quality	4.35	4.33	4.0
Training	4.57	4.33	4.1

Knowledge Transfer	4.0	3.91	3.31
Overall Score	4.47	4.33	4.15

The Panel felt that there was little obvious difference between the students supported on research grants and those supported through the DTA. Post meeting examination of the scores across all funding mechanisms shows that the scores for the DTA studentships across all the assessment criteria are slightly higher than for the project students or Industrial CASE students. The difference is not major; for example Knowledge Transfer had the largest differential with DTA students having a score of 4.0; CASE students 3.91 and Project Students 3.31. All DTA student criteria are higher, which is surprising, as these projects have not been through the same peer review process as Project Studentships.

The research quality was generally judged to be high; with the publication output impressive with some students. High quality journals were chosen to publish in some cases. Although the DTA projects are not peer reviewed, the scores suggest that the research quality is high in this scheme, and the quality of publication is high.

The training had varied exemplars of students preparing papers, and some had had the opportunity to do courses with industrial partners, or gain experience with international collaborators.
Such examples included:

"A student from Bristol University spending time with collaborators at the Scripps Institute to gain knowledge of the chemistry/biology interface"

"A synthesis student from St Andrews spent time with collaborators from the biology department at Vermont to identify potential protein targets.

"A student at Imperial College spent 3 months at GSK as part of the DTA project to use analytical equipment and learn preparative techniques not available at Imperial. The student is now a discovery chemistry team leader in industry".

Knowledge transfer showed that 39% of projects had some industrial involvement, and the flexibility of the DTA allowed collaborations to develop serendipitously, as the research direction could be changed quickly.
Examples of knowledge transfer included:

"One of the fine chemical products that resulted from this DTA grant has now been commercialised by Sigma-Aldrich and the relevant patent is held by Nottingham University"

"Work by St Andrews University on vinyl acetate carbonylation has been taken up commercially by Lucite International"

The Panel concluded the Review Day was a worthwhile exercise, and that the sampling method used for inviting supervisors to present the work of their students who had finished within a recent timescale made it easy to review and compare projects.

Both the panel and supervisors considered that it may have been useful for the students themselves to have been present. While it would have changed the nature of the event, it would have possibly allowed the panel to examine the appreciation of the research by the student.

5. Conclusions and Recommendations

Based on the Panel members' comments, the following conclusions can be reached:

- The panel thought the sample size reviewed at the event was sufficient to be representative of the whole, and reflected the overall quality.
- The overall quality of the research was internationally competitive and a significant proportion of grants were found to be internationally leading; the research quality delivered by the DTA studentships was the same standard or better than Project Studentships or the Industrial CASE mechanism.
- The studentship portfolio contained multidisciplinary research with many projects outreaching to other research areas. DTA studentships were particularly used to develop collaborations across boundaries, nationally, internationally and with Industry. Some collaborations evolved as the project progressed.
- DTA studentships in synthetic chemistry are being used for very speculative, adventurous and ambitious research; the most successful, innovative research projects were often started as a result of work tried out by studentships.

The major recommendations from the Panel were:

- The theme day format was successful in highlighting the high quality research carried out by students funded through both DTA and project studentships, and the sampling method for inviting the supervisors was valid and representative.
- The format of interviewing and discussing the project with the supervisors yielded far more information than sending in the proformas alone.
- The DTA scheme was not found to be funding "safe" areas of research. On the contrary, it was being used in a flexible way, to try out risky, adventurous ideas; quite often funding was being supplemented by industry, contributing to and training young scientists in knowledge

transfer. The panel were strongly supportive of this form of funding being maintained.

- The EPSRC should look at a mechanism for continuing some of the work of the studentship after the PhD has been completed, e.g. post-doctoral fellowships.
- It may be beneficial to have the student and supervisor both attend future similar events.
- Even though the invitation to attend the review event had been sent to heads of department, delegates would have appreciated more clarification for the rationale of the event. The potential outcomes of the event also required clarification.

Appendix A:

The Research, Training, Knowledge Transfer scoring system

Synthetic Chemistry Studentship Review Day

Research, Training, Knowledge Transfer Criteria

Research Quality
"Intrinsic excellence of the research in World terms"

5 = Research is World leading

4 = Research is competitive at an International level

3 = Research is competitive at a National level

2 = Research provides a modest contribution to the UK's scientific/engineering research standing

1 = Research makes little or no contribution to the UK's scientific/engineering research standing

Training
"Quality, effectiveness and output of trained people"

5 = Very high potential for the effectiveness and output of trained people

4 = High potential for the effectiveness and output of trained people

3 = Moderate potential for the effectiveness and output of trained people

2 = Limited potential for the effectiveness and output of trained people

1 = No potential for the effectiveness and output of trained people

Knowledge Transfer
"The potential for the research to contribute to UK wealth creation and quality of life through new or improved products processes and services"

5 = Very high potential for exploitation

4 = High potential for exploitation

3 = Moderate potential for exploitation

2 = Limited potential for exploitation

1 = No potential for exploitation

Appendix B: list of poster contributions

Grant Ref	Title	Principal Investigator	Organisation	Start	Assessors
DTA	Synthesis of chlorinated marine natural products	Professor Chris Willis	University of Bristol	Oct-01	Machin/Ruggierc
GR/S25593/01	A Unique High Power Tunable UV Laser Facility for Synthetic Photochemistry	Professor Kevin Booker-Milburn,	University of Bristol	2003	Machin/Ruggierc
DTA	The Use of Aminals and Acetals in the Baylis Hillman Reaction	Professor Varinder Aggarwal	University of Bristol	Oct-02	Machin/ Ruggiero
DTA	An organic synthesis programme in Cambridge (S V Ley Group)	Professor Steven Ley	University of Cambridge	Oct-03	Styring/Maitra
GR/S40343/01	An organic synthesis programme in Cambridge (S V Ley Group)	Professor Steven Ley	University of Cambridge	Oct-03	Styring/Maitra
GR/S40343/01	An organic synthesis programme in Cambridge (S V Ley Group)	Professor Steven Ley	University of Cambridge	Oct-03	Styring/Maitra
DTA	Novel annulation reactions: From new synthetic methodology to total synthesis	Dr Mark Elliott	Cardiff University	Oct-02	Machin/Ruggierc
DTA	Developments of general methods for the stereoselective synthesis of polythene natural products	Dr Andy Whiting	University of Durham	Oct-02	Styring/Maitra
DTA	Organotransition metal complexes featuring conjugated ligands	Dr Paul Low	University of Durham	Oct-01	Scott/Powell
GR/R67163/01	From hydrogen bonds to triple bonds	Dr Simon Lancaster	University of East Anglia	Jul-02	Scott/Powell
DTA	Stereomanipulation of eta5 1-aryl iron complexes	Dr Richard Stephenson	University of East Anglia	Oct-04	Scott/Powell
DTA	Towards redox control of organometallic molecular polymerisation catalysts	Professor Nicholas Long	Imperial College London	Jan-03	Scott/Powell
DTA	An investigation into the substrate specificity of foot and mouth	Professor Robin Leatherbarrow	Imperial College London	2002	Graham/Davis
DTA	Low coordinate metal alkyls for small molecule activation and catalysis	Dr Mike Hill	Imperial College London	2002	Graham/Davis
DTA	Stereoselective Claisen and related rearrangements	Professor Donald Craig	Imperial College London	Oct-01	Graham/Davis
DTA	Carbonyl ene reactions for paclitaxel synthesis	Professor Donald Craig	Imperial College London	Oct-01	Graham/Davis

GR/R92042/01	Monodentate and Bidentate Organoboron Lewis Acids	Dr George Britovsek	Imperial College London	Jan-03	Graham/Davis
DTA	Synthesis and Stereochemistry	Professor Jonathan Clayden	University of Manchester	2001	Graham/Davis
DTA	Solvothermal synthesis of d-transition metal cluster complexes	Professor Eric McInnes	University of Manchester	2001	Machin/Ruggierc
DTA	synthetic Ligand gated channels	Dr Simon Webb	University of Manchester	Jan-03	Machin/Ruggierc
DTA	Nucleic acid mimics and dynamic-cominatorial approaches towards the non-enzymatic transcription of nucleic acids	Dr Jason Micklefield	University of Manchester	Sep-02	Machin/Ruggierc
DTA	Sub-valent lanthanide compounds	Dr Keith Izod	University of Newcastle	Oct-02	Scott/Powell
DTA	Catalytic Asymmetric C-C Bond formation	Professor Simon Woodward	University of Nottingham	Oct-01	Scott/Powell
DTA	Diels-Alder approaches to naturally occuring octahydronaphthalenes	Professor Barry Lygo	University of Nottingham	2001	Scott/Powell
DTA	The development of Assymetric Synthesis	Professor James Anderson	University of Nottingham	Sep-01	Scott/Powell
DTA	An Enantioselective total synthesis of the Proteasome Inhibitor (+)-Lactacystin	Dr Christopher Hayes	University of Nottingham	Oct-02	Scott/Powell
DTA	Asymmetric Sigmatropic rearrangements of Ammonium Ylids	Dr Joe Sweeney	University of Reading	2003	Styring/Maitra
DTA	Vinyl acetate carbonylation	Professor David Cole-Hamilton	University of St Andrews	Sep-01	Machin/Ruggierc
DTA	The synthetic chemistry in chemical genetics	Dr Nick Westwood	University of St Andrews	Sep-02	Machin/Ruggierc
DTA	The chemistry of naphta[1,8-*cd*]-1,2-dithiole and it's related compounds	Professor Derek Woollins	University of St Andrews	Oct-02	Scott/Powell
CASE	Asymmetric synthesis of nitrogen containing heterocycles using enantioselective transfer hydrogen	Professor Martin Wills	University of Warwick	Apr-02	Styring/Maitra
DTA	Membrane separated catalysts in racemisation and kinetic resolution processes	Dr Paul Taylor	University of Warwick	2005	Styring/Maitra
DTA	Total synthesis of (±)-Luminacin D	Professor Mike Shipman	University of Warwick	Oct-01	Styring/Maitra

CASE	Bifunctional supported reagents	Dr Andrew Marsh	University of Warwick	Oct-02	Styring/Maitra
DTA	Self-assembled dendritic nanomaterials	Professor David Smith	University of York	2002	Graham/Davis
DTA	One pot multi-step organic transformations	Professor Richard Taylor	University of York	2001	Graham/Davis
DTA	Conformational flexibility in carbobicyclic diphosphinite ligand	Dr Ian Fairlamb	University of York	2002	Graham/Davis
DTA	Rhodium-catalysed tandem processes in organic synthesis	Dr Christopher Frost	University of Bath	Oct-02	Scott/Powell
DTA	New stereoselective routes to piperidines	Dr John Snaith	University of Birmingham	Oct-02	Machin/ Ruggiero
DTA	Unidirectional two-step photoinduced energy transfer in metallo-cyclodextrin	Dr Zoe Pikramenou	University of Birmingham	Oct-01	Machin/Ruggiero
GR/S04659/01	New nitrogen donor ligands for zwitterionic transition metal alkene polymerisation catalysts	Dr Phillip Bailey	University of Edinburgh	Apr-03	Scott/Powell
GR/R86744/01	New hydroxamic acid ligands for asymmetric V-catalysed epoxidation	Dr Andrei Malkov	University of Glasgow	Oct-02	Machin/ Ruggiero
DTA	Synthesis of tetraazamacrocyclic antiparasitic agents	Professor D Robins	University of Glasgow	Sep-03	Machin/Ruggiero
DTA	Developing an "impossible" reaction. The catalytic asymmetric bromination reaction of alkenes	Dr Chris Braddock	Imperial College London	Jan-01	Scott/Powell
DTA		Professor Ron Grigg	University of Leeds		Scott/Powell
GR/R53227/1	Supramolecular assemblies with carboranes	Dr M Hardie	University of Leeds	Oct-01	Styring/Maitra
DTA	New interactions between boron clusters and metal centres	Professor John Kennedy	University of Leeds	Sep-02	Styring/Maitra
DTA	Asymmetric synthesis of quaternary (*E*)-vinylglycines: Total synthesis of myriocin	Dr Steve Marsden	University of Leeds	Oct-02	Styring/Maitra
DTA	Application of difuryl amino alcohols in the two-directional synthesis of aza-*C*-linked disaccharides	Professor Adam Nelson	University of Leeds	Oct-01	Styring/Maitra
CASE	The use of carbonic acid in synthetic organic chemistry	Professor Christopher Rayner	University of Leeds	Oct-02	Graham/Davis

DTA	Hetero-annulation of carbohydrates	Professor Paul Cullis/Dr Paul Jenkins	University of Leicester	Oct-02	Graham/Davis
DTA	The synthesis of azadisaccharides and aminopyrrolidines as novel glycosidase inhibitors	Dr Sandeep Handa	University of Leicester	Oct-01	Graham/Davis
DTA	Preparation of novel functionalised sulfimide ligands	Dr Martin Smith	Loughborough University	Oct-02	Graham/Davis
DTA	New synthetic routes to oligothiophene derivatives: new electroluminescent materials	Dr George Weaver	Loughborough University	2002	Scott/Powell
GR/M42565/02	Turning up the heat! High temperature routes to high nuclearity	Professor Richard Winpenny	University of Manchester	Jan-99	Scott/Powell
GR/R46021/01	New ligands for high spin cages and single molecule magnets	Professor Richard Winpenny	University of Manchester	Oct-01	Scott/Powell
DTA	Studies on the total synthesis of the lituarines	Dr Jeremy Robertson	University of Oxford	Oct-02	Machin/Ruggierc
DTA	The synthesis of neoglycoconjugates	Dr Antony Fairbanks	University of Oxford	Sep-02	Machin/Ruggierc
CASE	Reformatsky reactions	Dr Mark Maloney	University of Oxford	Sep-02	Machin/Ruggierc
DTA	Synthesis of the immunosupressants SWF C and D	Professor Jack Baldwin	University of Oxford	2001	Machin/Ruggierc
DTA	Synthesis of six-membered heterocycles containing oxygen and nitrogen	Professor Timothy Donohoe	University of Oxford	Oct-02	Styring/Maitra
GR/N16624/01	Combinatorial-type approaches to new polymerisation catlysts based on triazacyclic and related ligands	Professor Phillip Mountford	University of Oxford	Jan-02	Styring/Maitra
GR/R95005/01	Au---Au interactions: correlated structure-luminescence studies	Dr Christina Lagunas	Queen's University Belfast	Apr-03	Scott/Powell
DTA	Application of M-X…X'-C halogen bonds in crystal synthesis	Dr Lee Brammer	University of Sheffield	Jan-03	Graham/Davis
CASE	Synthesis of functionalised piperidines via enantiospecific [3+3] reactions and application in the total synthesis of nuphar alkaloids	Dr Joe Harrity	University of Sheffield	Oct-02	Graham/Davis
DTA	Development and applications of functionalised zinc reagents using a mechanistic approach	Professor Richard Jackson	University of Sheffield	Oct-01	Graham/Davis

DTA	Total synthesis of cavicularin and riccardin C: Addressing the synthesis of an arene adopting a boat configuration	Professor David Harrowven	University of Southampton	2001	Scott/Powell
DTA	The enantioselective synthesis of α,α',ß,ß'-tetrafluorinated pentoses and hexoses	Dr Bruno Linclau	University of Southampton	Oct-02	Graham/Davis
DTA	Novel lipids and lipopeptides	Dr Helen Hailes	University College London	2002	Styring/Maitra

Appendix C: Blank synopsis form

Studentship Research Review Day
Synthetic Chemistry

SYNOPSIS OF RESEARCH ACTIVITIES

Please complete and return the proforma via e-mail Carol.Becker@epsrc.ac.uk to EPSRC by **Friday, 27th April 2007**. Please provide the EPSRC references for the activities covered by the synopses and the total value of your EPSRC support. Note: if DTA or CASE studentships are included, please use student surname as reference.

EPSRC References:
Dates of studentship - From: **To:**
Presentation Title:

Principal Investigator/Supervisor(s):
Department:
Institution:
Value of EPSRC project support:

Staff: **Equipment:** **Other Costs:**

Total:

No. of DTA students: ☐ **No. of Industrial CASE students:** ☐

No of Project Students ☐

Overall aim of project: *Describe the primary objectives of the studentship project.*

Summary of scientific achievements: *Describe the main results obtained to date and their significance (in a UK and world context) and briefly explain how these were achieved.*

Research training of student: *Please describe the research training they have received or are receiving and, where relevant state the name of the subsequent employer.*

Relevance of the Research: *Describe the potential relevance of the research to both industrial/commercial users and other academic user. Please specifically note any collaborations (again, academic or commercial) that have arisen and any incidence of results take-up. List any publication or, conference papers resulting from this project.*

Publicity: *Where applicable, list any publication, presentation or, conference papers resulting from this project.*

Supplementary questions

How important to your research is EPSRC doctoral funding

Where else do you source doctoral funding

Appendix D: Analysis card for research grants

Analysis card for research grants

Synthetic Chemistry Studentship Research Review Day Analysis Card
June 2007

1 FOR EACH STUDENTSHIP PLEASE

Individual Project Analysis Card

Please complete an analysis card for each grant presenting a poster at the Review event. Analysis cards will be used to help provide an overall evaluation of the grants within the Synthetic Chemistry theme

Supervisor:	
Grant / Student Reference:	
Funding Mechanism:	
Research Areas	

	Low		Satisfactory		Excellent
	1	2	3	4	5
1. **Research** – Quality and scientific impact	☐	☐	☐	☐	☐
2. **Training**: Quality and effectiveness	☐	☐	☐	☐	☐
3. **Knowledge Transfer**: Exploitation by others	☐	☐	☐	☐	☐
4. Overall assessment	☐	☐	☐	☐	☐

Please tick appropriate box

1. What is the key contribution of this PhD project to the field (actual or potential)?

.....
.....

2. What has aided/limited the research achievement of this project?

.....
.....

3. Does this work duplicate other work in the field/portfolio (inc. non-EPSRC funded work)?

.....
.....

4. Has or will this project interact with other fields?

.....
.....

5. Has this project provided useful research training opportunities?

.....
.....

6. What new research avenues/products/processes have been produced (potential or actual)?

.....
.....

7. Have there been appropriate peer reviewed papers, patents etc. resulting from this project?

.....
.....

8. Has there been or will there be knowledge transfer or exploitation resulting from this project?

.....
.....

9. Are there any other follow on activities (apart from technology transfer) planned, based on this ?

.....
……..

Appendix E: Review event timetable

SYNTHETIC STUDENTSHIP EVENT
26TH – 28TH JUNE 2007

Timetable

Day 1 (27th June)

9am – 10am Delegates arrive and set up posters

10am- 10:15 Welcome Dr Peter Machin

10:15- 10:30 Introduction – Dr John Baird Chemistry Programme Manager

10:30 11:15 Keynote presentation on synthesis
Prof Erick Carreira, ETH Zurich

11.15- 11.30 Coffee in room

11.30- 13:00 Poster session AM - posters in market place format, panel work in pairs, and are allocated a selection to review.

13:00- 14:00 Lunch

14:00- 14:30 Presentation by Dr Alasdair Rose EPSRC

14.30– 16.00 Poster sessions PM

16:00-16:30 Programme Manager close and thank you – Chair

16:30- 18:00 Panel debrief and conclusions

Day 2 (28th June)

9am – 10am Delegates arrive and set up posters

10am- 10:15 Welcome Dr Peter Machin

10:15- 10:30 Introduction – Dr John Baird Chemistry Programme Manager

10:30 11:15 Keynote presentation on synthesis
Prof Annie Powell, University of Karlsruhe

11.15- 11.30 Coffee in room

11.30- 13:00 Poster session AM - posters in market place format, panel work in pairs, and are allocated a selection to review.

13:00- 14:00 Lunch

14:00- 14:30 Presentation by Dr Carmine Ruggiero, EPSRC

14.30– 16.00 Poster sessions PM

16:00-16:30 Programme Manager close and thank you – Chair

16:30- 18:00 Panel debrief and conclusions