

IUPAC

Sub-Committee on Materials Chemistry

15 August 2005

Beijing

DRAFT MINUTES

Present [Division membership, young observer or other status]: J Corish (Chairman) [II], A R West (Acting Secretary) [II], L V Interrante [II], D Rabinovich [YO], G McCann [RSC representative], A M Tshavhungwe [South Africa, capacity building], R Jones [IV], C Gorman [YO], Z Zeng [YO], R Weir [I], G Rosenblatt [II], S Mathur [II].

Apologies: A V Chadwick, J Maier, E R, CC, F Adams (JC to provide complete list).

1. Minutes of Ottawa Meeting

These had previously been circulated electronically. JC gave a summary of the meeting and said that all actions arising had been completed, apart from preparation of the website. To do this should now be relatively easy since IUPAC (Fabienne) are setting up a web system to allow members to input information in a convenient format. **Action: RJ to pursue, with assistance from JC.**

2. Project to Define Materials Chemistry

This has received IUPAC approval with Prof P Day as Project Leader. In his absence, Dr G McCann updated the subcommittee on progress. The project will run for 2 years. The objective is to produce a statement showing how Materials Chemistry can fit within the overall IUPAC structure.

PD has met with a) ARW for preliminary discussions about the mechanism and scope of the project and b) the RSC Materials Chemistry Forum, following which GM prepared an initial statement.

GM's presentation had two main features, a) the target audience for the IUPAC project and b) the content of the definition of Materials Chemistry. First, GM indicated that primarily the audience was the IUPAC organisation and membership. Following discussion over this, which included also the appropriate home of the Materials Chemistry sub-committee, it was agreed that Materials Chemistry is clearly an interdisciplinary area that crosses the borders of several Divisions within IUPAC, although Division II Inorganic is its current principal home.

GR commented that if the prime audience is the IUPAC community then an article for CI should form one of the main outputs. LVI and GM also indicated that their respective journals could well highlight the result of the IUPAC project in, for instance, an editorial as well as on their respective websites. JC commented that it is very important to integrate Materials Chemistry within the IUPAC organisation, as well as to make public statements about Materials Chemistry. GM then spoke about his initial efforts to define Materials Chemistry and the difficulties that were likely to be encountered, especially at the fuzzy interfaces with other disciplines of Chemistry.

To promote discussion, GM then presented the first draft of a definition of Materials Chemistry based on his experience as Editor of the Journal of Materials Chemistry, as follows:

“The synthesis, processing, characterisation and exploitation of compounds that have useful, or potentially useful, properties and applications. The focus of the research is the creation, understanding and development of substances or systems with improved properties that will impact positively on business and personal life. To use chemistry to create compounds that may lead to new technological opportunities or significant improvements in existing technology.

As expected and hoped, this generated a considerable amount of positive discussion, including the following points:

The word ‘compounds’ may be falling out of use somewhat in Material Chemistry and for the moment, the word ‘substances’ is used instead.

CG commented that, from the draft definition, the remit of Materials Chemistry could easily include Medicinal Chemistry with medical applications of Materials and questioned whether it is worthwhile to try and distinguish Medicinal from Materials Chemistry. By contrast, JC stated that, at his University (Trinity, Dublin), there are two Chemistry degree programmes in a) Advanced Materials and b) Medicinal Chemistry, with essentially no overlap in content. After considerable discussion, there was no consensus as to whether Medicinal Chemistry would be 'in' or 'out', but it was felt that the interface was fuzzy; areas such as the PEGylation of materials of possible pharmaceutical application could possibly fall within the scope of Materials Chemistry since this would not necessarily fall within the focused remit of pharmaceuticals.

Questions were raised as to whether catalysts (ZZ), structural materials (RJ) and organometallic compounds as precursors to inorganic solids (GM) belong within the remit of Materials Chemistry. There was considerable discussion as to the distinction between Materials Science and Materials Chemistry (GM, ARW), since both areas target properties/applications; the difference may well come down to the level of chemistry content, but this was not agreed upon definitely. The distinction between molecular and solid state inorganic materials was highlighted (ARW) and the point made that many established areas of what could be legitimately regarded as Materials Chemistry already have a home for publishing elsewhere, e.g. Catalysts and Solid State Chemistry/Physics.

The point was made that the ACS journal, *Chemistry of Materials*, and the RSC journal, *Journal of Materials Chemistry*, both arose to fill an identified need for chemists to be able to publish work that does not clearly fall within the remit of conventional inorganic/organic/physical chemistry journals; as a result, the remit of these journals has effectively been decided by the readership/authorship. One point to emphasise and about which there was no dissension, is that Materials Chemistry is now certainly a major branch of Chemistry. This is illustrated by the facts that: the two journals referred to above are now among the largest journals published by the ACS and the RSC; the Journal of Materials Chemistry is certainly the most rapidly-growing journal within the RSC; the Chemical Congress in Beijing has a major Materials Chemistry programme with a huge poster session. GR commented that

IUPAC has already recognised the significance and growth of Materials Chemistry and that he had received an immediate and positive response from IUPAC for setting up the Materials Chemistry sub-committee.

3. Project to Produce a Glossary of Terms Used in Materials Chemistry: Nano-related Terminology

By way of introducing himself, Dr Sanjay Mathur gave a presentation on some of his research interests in the area of nanoparticles and their incorporation into composites to achieve modified properties such as, for instance, loading polymers with oxide particles with applications, for example, as abrasion-resistant paints. He also presented some key results on preparation of precursor materials for magnetite, Fe_3O_4 and possible applications of these in the technique of magnetic hypothermia to kill cancer cells; work is already at the stage of clinical trials and represents a very good example of collaboration between Chemists, especially Materials Chemists, Biologists and Medical Practitioners.

He then described his attempts, following the Ottawa GA at which he was encouraged to consider preparing a Glossary in Materials Chemistry, to generate some interest in this project. It became clear that the project was probably over-ambitious and that it could be difficult to get potentially-interested parties to participate in a project that rather lacked focus.

He therefore reconsidered his options and is now proposing a nano-related project to collate an agreed glossary of terms which, perhaps, have the prefix 'nano'. This suggestion was received with much enthusiasm from the sub-committee; in particular, a focused project on nano-related terminology could perhaps form the first step in a much wider glossary of terminology in Materials Chemistry. Considerable helpful discussion followed concerning how to establish an agreed terminology in an emerging area such as this (CG, GR). A 'straw horse' approach was suggested, in which, in the first instance, SM would circulate a rough draft listing nano-related terms that he had encountered from an initial literature survey, to a selected group of individuals for comment, with the hope that a focused request such as this should receive a good response, especially from people who themselves have proposed new

terms. RJ commented on the mammoth nature of the task that preparing a glossary can become, from his personal experience of an almost-completed project associated with sol-gel and hybrid material terminology.

Following some discussion/uncertainty about the status of any recommendations that arise from this, or any other project, JC commented that IUPAC has a clear ratification procedure in which any project outcome is submitted to the ICTNS, who consult with fifteen independent referees, before something such as a glossary becomes an established IUPAC recommendation. The question of having an active website to allow the public to input comments was discussed and felt to be worthwhile, but that at the conclusion of the project, an active website would necessarily close, since IUPAC would not wish their recommendations to be updated in an *ad-hoc* manner. RJ commented that Division IV has a polymer-related project on aggregation and self-assembly and that the proposed Mathur project on nano terminology could be done in parallel, with some interaction between the two projects. JC commented that the proposed nano terminology project would require discussion with other Divisions, especially Physical (RW) and should involve as many as possible of the well-known figures within the nano community.

Division VIII had received an approach from Rice University about a possible project/conference in nano terminology, but as yet nothing had been finalised; presumably Division VIII would also be interested in this proposed project. ZZ suggested including appropriate ACS Editors/Board members in any Task Force. It was commented that this proposal for work on terminology at the frontiers of Materials Chemistry, at which changes occur spontaneously, had many similarities to the recently terminated project on terminology of 'Fullerenes'. The Fullerene project took considerable time, but was eventually successful and is good for giving IUPAC a high profile in this developing area of chemical research.

The following action plan was proposed:

SM indicated that he could quickly revise his proposal with a scaled-down budget, probably in the £8-10k range, for a 3-year programme. This should be submitted to Materials members of Division II for initial help and comment, following which the

final version should be submitted to Division II (ARW), who would then forward it to Fabienne requesting that all Divisions be invited to comment and offer support if interested.

4. Course Development in Materials Chemistry

LVI has received comments about the lack of text books and established curricula in Materials Chemistry and made the observation that there is a clearly defined need for appropriate undergraduate course material. After some discussion it was felt that preparation of a draft curriculum could well form the basis of an IUPAC project and LVI was given the go-ahead to contact David Avnear about the possibility of preparing a project submission.

5. Workshops on Advanced Materials

The status of WAM III, due to be held in South Africa in September 2005, was discussed. JC commented on the difficulties of establishing an easy form of communication with R Sanderson. SM indicated that, from his recent visit to South Africa, there exists the possibility of a joint Germany-South Africa Symposium, to be attached to WAM III. Notwithstanding difficulties over communication with the organisers of WAM III, a programme is now available, although perhaps has not been publicised as widely as it could have been; it was felt that the principle behind the WAM activities is good and that following conclusion of WAM III, plans could be made for WAM IV, with China or South America as two possible locations (SC to contact DR to determine possible interest).

6. The Future of the Materials Subcommittee

Several of the subcommittee members have continued membership on Division II and therefore the immediate future is assured. However, new recruits are certainly needed. There was much dismay that the organisers of the Congress did not respond to the suggestions from the Materials Chemistry Subcommittee, of possible involvement in the organisation of the Materials Chemistry programme. Following Ottawa it had been the intention of the Materials Chemistry Subcommittee to hold a

Materials Chemistry Workshop at some stage during the Beijing meeting, but with zero interaction with the Chinese organisers, this proved impossible.

7. Future Meetings

Since the bulk of the membership of the Materials Subcommittee is also associated with Division II, it is proposed that the next meeting of the Materials Subcommittee be held just before/after the off-year meeting of Division II, which, at this stage, is likely to take place in Seattle, USA in August 2006.

8. Other Actions

i) ARW to raise the question of possible involvement of the Materials Chemistry Subcommittee in the Torino Congress.

ii) JC to send copies of these Minutes to other Division Presidents for their information and requesting that, if interested, they nominate new members for the Subcommittee.