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Introduction by the EU project coordinators

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This issue of *Catalysis Today* research contains results from the field of catalytic hydrocarbon oxidation which are the partial outcome of two projects which have been supported by the European Union within its Human Capital and Mobility programme.

Our projects dealt with:

Catalysis and Catalytic Reaction Engineering for the Utilisation of Light Hydrocarbons: From Fundamental Aspects to Application

(Co-ordinator: Manfred Baerns, Ruhr-University Bochum, Germany)

Catalytic Functionalization of Lower Alkanes

(Co-ordinator: Robbie Burch, University of Reading, Great Britain)

Both projects were a valuable experience for all the participating PhD students, postdocs, senior scientists and professors from many EU countries who regularly met for scientific discussions exchanging their different views on the common research, thereby, not only stimulating progress in the sciences, but also enhancing personal cooperation between the various research groups. From these points of view, we consider unanimously the programme to have been an impressive success.

A short outline of the procedures applied in the two networks is given below; we think this may be useful for other future endeavours of this kind.

1. EUROXYCAT Network

The following research laboratories participated in the network:

Institut de Recherches sur la Catalyse, Villeurbanne/France (C. Mirodatos).

Université de Technologie de Compiègne, Compiègne/France (P. Courtine/E. Bordes).

Ruhr-University Bochum, Dept. Ind. Chem., Bochum/Germany, (M. Baerns and W. Gruenert)

Institute of Applied Chemistry Berlin-Adlershof e.V., Berlin/Germany (B. Luecke)

Chemical Process Engineering Research Institute, Thessaloniki/Greece (I. Vasalos)

Institut of Chemical Engineering and High Temperature Chemical Process, Patras/Greece (X. Verykios)

University of Limerick, Limerick/Ireland (K. Hodnett)

Eindhoven University of Technology, Laboratorium Voor Chemische Technology, Eindhoven/The Netherlands (G. Marin)

Technical University of Trondheim, Trondheim/Norway (A. Holmen)

The research work was divided into five tasks to which all of the groups contributed:

Fundamental studies of solid-state chemistry and physics of supported metal and metal oxide catalysts;

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Chemical composition and geometric and electronic structure of surfaces;
Interaction of gaseous molecules with catalytic surfaces;
Intrinsic kinetics and mechanism of model reactions;
Chemical reactor modelling and analysis

These subjects were critically discussed during three workshops:

Kinetic Data from Steady-state Tubular-flow Fixed-bed Reactors and Gradientless Recycle Reactors; and Kinetic Data from Transient Experiments in Tubular-Flow Fixed-bed Reactors, Gradientless Recycle Reactors, TAP-Reactor and Steady-state Isotopic Transient Kinetic Analysis (Bochum, November 1994; 14 oral contributions). Solid-state and Surface Properties and the Interaction between Gas Phase and Surface in Catalytic Oxidation (Villeurbanne, October 1995; 10 oral contributions).

Reactor Modelling and Analysis – Kinetics and Mechanism (Thessaloniki, October 1996; 12 oral contributions).

As a result of these workshops, specific know-how and many ideas were transferred between the various research laboratories; this leading to a continuous research exchange of students and scientists between the participating groups and finally to joint publications.

The success of the Euroxycat network is finally illustrated by some statistical data on the exchange of scientists and joint publications, i.e. such in which at least two of the network laboratories participated:

Exchange of scientists for more than 4 weeks: 16;
For less than 4 weeks: 15;
Joint publications: 27, not including those in this issue.

2. Network on Catalytic Functionalisation of Lower Alkanes

The following research laboratories (and principal investigators) participated in the work:

Universita di Bologna, Italy (Prof. F. Trifiro)

University College Cork, Ireland (Prof. J. Cunningham)

University of Limerick, Ireland (Prof. J.R.H. Ross)

University of Liverpool, UK (Prof. G.J. Hutchings)

CSIC, Madrid, Spain (Prof. J. Fierro)

Politecnico di Milano, Italy (Prof. C. Mazzocchia)

CNRS, Villeurbanne, France (Prof. J.C. Volta)

Universiteit Twente, The Netherlands (Prof. J. Lercher)

CSIC, Valencia, Spain (Prof. J.M. Lopez Nieto)

CNRS, Strasbourg, France (Dr. R. Keiffer)

Instituto Superior Technico, Lisbon, Portugal (Prof. M. Portela)

The overall objective of the project was to develop a fundamental understanding of the relationship between the structure and catalytic properties of multi-component selective oxidation catalysis, specifically for the partial oxidation of ethane, propane, butane and pentane.

The research has concentrated on two main themes, namely, oxidative dehydrogenation of alkanes, and partial oxidation to oxygenates. Novel catalyst samples have been prepared, new methods of catalyst synthesis have been developed, and mechanistic information has been obtained. An improved understanding of the parameters which influence the catalytic properties of complex-mixed oxides is emerging. The nature of the active centres in some of the mixed oxide catalysts has been clarified, and the main role of promoters has been established.

This collaborative research has led (so far) to 30 joint publications in refereed journals and 25 conference proceedings. The research, over 3 years, has involved 34 research staff in the institutes, and 40 young researchers who were given a total of 177 man-months of training.

Exchange visits of less than 4 weeks were undertaken on 24 occasions and there were 14 working visits of greater than 4 weeks.

3. Concluding remarks

- The HCM networks as well as the succeeding TMR (Training and Mobility of Research) networks are a significant means of fostering European scientific cooperation.

- The scientific quality of research is enhanced by the intra- and inter-competitive nature of these networks.
- The progress of research and development in the various areas of science is supported by close cooperation in the EU countries.
- Funding of this kind of focused cooperation should not only be maintained but also increased; if necessary by restraining large-scale research and development projects financed by the EU.