

Editorial

EDITOR'S NOTE. Publishing the proceedings of international conferences is one of the cornerstones of academic applied research. They provide documenting organized and focused recent results and information on new trends in research. Proceedings promote the sharing of knowledge and inspire new directions of research.

These special issues of the Intern. J. Photoenergy bring together reviewed papers presented at the 2nd European Meeting on "Solar-chemistry and Photocatalysis: Environmental Applications-SPEA2" held in Saint-Avold, France at May 2002. The topics covered by the many papers are of importance in photocatalysis, solar chemistry and environmental photochemistry.

Special thanks are due to Didier Robert for editing the manuscripts for publication.

Prof. M. S. A. Abdel-Mottaleb
Founding Managing Editor

PREFACE

The success of the first European meeting on Solar Energy, Solar Chemistry and Environment "JCSEE" that has been held in Saint-Avold on February 2000 and chaired by Dr. Didier Robert and hosted by Prof. Jean-Victor Weber, Head of the Environment and Clean Processes Group of LCA, prompted us to organize the 2nd meeting in May 2002.

The main topics of the meeting were focused on environmental applications of Solar Chemistry, Solar thermochemistry and more specifically on Heterogeneous Photocatalysis. Seven main general subjects were selected:

1. Water treatment and disinfection.
2. Air and soil treatment.
3. Green synthesis by solar-chemistry, photochemistry and photocatalysis.
4. Developments of new materials for photochemistry and photocatalysis.
5. Development and perspectives in environmental photochemistry.
6. Commercial applications.
7. Solar thermochemistry.

The conference has been attended by some of one hundred participants from academia, research institutions and industry representing 22 countries from all over the world. The generous sponsorship from Saint-Gobain-Research, Millennium Chemicals, the city of Saint-Avold, The Région Lorraine, the European Association of Chemistry and Environment (ACE) and the

University of Metz should be highly acknowledged. I am also thankful to the members of the organizing committee for their sincere efforts that make this meeting a very successful one. I would like also to thank the members of the Scientific Committee: *H. Al-Ekabi* (Canada); *D. Bahnemann* (Germany); *M. Bekböletl* (Turkey); *O. Enea* (France); *J. Gimenez* the organizer of the coming 3rd meeting in 2004 (Spain); *M. Grätzel* (Switzerland); *J. M. Herrmann* (France); *J. Lédé* (France); *S. Malato* (Spain), *M. T. Maurette* (France); *A. Mills* (United Kingdom); *E. Oliveros* (Germany); *D. Ollis* (USA); *L. Palmisano* (Italy); *E. Pelizzetti* (Italy); *P. Pichat* (France); *C. Pulgarin* (Switzerland); *J. V. Weber* (France) and *O. Zahraa* (France).

In addition to 4 invited lectures, 80 contributions were submitted by participants, from which 42 have been selected for oral presentation and 38 for poster sessions. The first plenary lecture of the meeting entitled "Integrating photocatalysis and membrane technologies for water treatment" has been presented by *Prof. David Ollis* (North Carolina State University, Raleigh, USA). *Prof. Michael Grätzel* (EPFL Lausanne, Switzerland) has presented the second plenary lecture on "Photocatalysis and Photoelectrochemistry with Nanocrystalline Oxide Semiconductors". The third lecture entitled "Photocatalytic degradation of organic compounds in aqueous and gas phase" was delivered by Dr. Marie-Thérèse Maurette from Toulouse University (France). *Prof. Michel Bouchy* from ENSIC Nancy (France) has presented the last plenary lecture on "Photocatalytic reactor".

These special issues are divided in four parts according to the research topics:

The first part is devoted to the study of the photocatalytic degradation of organic compounds in the presence of TiO₂. The three first papers (1-3) examined the

photocatalytic degradation of common textile dye like: reactive yellow 17 (Neppolian *et al.*), two azo-dyes—an industrial one (Congo Red), and an alimentary one (amaranth) (Puzenat *et al.*) and Acid Orange 7 (Stylidi *et al.*) by photocatalysis over TiO₂ photocatalyst coated on the glass plates (reactor) using cement as a binder or in suspension. The aims of the manuscripts 4 and 5 are to investigate the photomineralization with titanium dioxide and ozonation of organic macromolecules found in natural waters: humic acid (Wisniowski *et al.* and Kerc *et al.*). The experimental research on photocatalytic oxidation (PCO) of aqueous solutions of de-icing agents (ethylene glycol and ethylene glycol monoethyl ether) and methyl tert-butyl ether (MTBE) (Krichevskaya *et al.*) and of the herbicide atrazine (Zahraa *et al.*) was the aim of the manuscripts 6 and 7.

The use of support for the photocatalyst is the subject of the second part (papers 8–10). Different supports and techniques can be used for obtaining supported photocatalysts. Thin films of Anatase TiO₂ nanoparticles have been deposited onto glass substrates by dip-coating and eventually further crystallized by heat-treatment up to 300 °C (Vicente *et al.*) or by the chemical vapour deposition using Ti(dpm)₂(Oprⁱ)₂ complex compound (CC-CVD method) (Besserguenev *et al.*). Fernandez *et al.* develop new supports like Nafion cationic membranes, Nafion glass-mat composites and Modified Copolymers.

The seven manuscripts (11–17) of the third part deal with the physical properties, the enhancement of the photocatalytic efficiency and the preparation of new photocatalysts. Waldner *et al.* measured the polarization curves on irradiated TiO₂ layers in various electrolytes, namely sodium hydroxide, sulphuric acid, oxalic acid and potassium oxalate. Novel composite silver/titania immobilized on glass substrates were prepared, characterized and their photocatalytic activity was evaluated in the paper of (Falaras *et al.*). Paper 13 describes an investigation of the photoreactivity of ETS-10 with the particular objective of evaluating the potential of this novel material as a zeolitic photocatalyst (Krisnandi *et al.*). The next four papers (14–17) deal with the preparation of the TiO₂ photocatalyst with various procedures like Plasma Sprayed Coatings

(Toma *et al.*), by sol-gel method combined with supercritical drying for the preparation of Titania aerogels (Malinowska *et al.*) and finally by classical sol-gel technique to obtain nanosized titanium oxide (TiO₂) powders (Bessekouad *et al.*) and spectro-pure titanium dioxide (Kapinus *et al.*).

The fourth part is devoted to Environmental Applications of solar chemistry and photocatalysis. The coupling of adsorption with two different photochemical oxidation methods was investigated by Monneyron *et al.*, in order to treat industrial gaseous effluents containing a low concentration of Volatile Organic Compounds; paper 18. In the paper 19, using heterogeneous photocatalysis, the radical addition of tertiary amines with electron deficient alkenes can be performed in high yields (up to 98%) and high facial diastereoselectivity. The photochemical induced electron transfer process initiates the radical chain reaction and inorganic semiconductors like TiO₂ and ZnS were used (Marinkovic *et al.*). The results of the heterogeneous photocatalytic reduction of Fe(VI) in UV-irradiated TiO₂ suspensions presented in the manuscript 20 by Sharma *et al.* suggest indirect observation of the formation of Fe(V) by the photoreduction of Fe(VI) with e_{cb}⁻ at TiO₂ surfaces. Because Fe(V) selectively and rapidly oxidizes low reactivity pollutants with the production of the non-toxic by-product, Fe(III), the photocatalytic reduction of Fe(VI) has a role in pollution remediation processes. Finally the aim of the last paper (21) is to give some aspects of studies related to chemical engineering of photocatalysis; far from being exhaustive, it aims at giving an insight into the extent and importance of this topic. The presentation deals with three selected subjects: light distribution within a reactor, mass transfer processes and a brief survey of photochemical reactors (Bouchy *et al.*).

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