Catalysis Letters: Editorial

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It is really my pleasure to introduce myself as your new associate editor of Catalysis Letters whose responsibilities will be focussed on the area of photocatalysis. Having been active as both, a researcher and an educator in this research field for almost four decades now I am convinced that we are still far away from “Understanding Photocatalysis” [1]; and this is where I would like to see the future focus of the research concerning photocatalysis published in this journal. Let me be a little more specific about this.

During recent years we have seen a large majority of research papers following an almost identical structural pattern: a new potential photocatalyst is synthesized (nowadays often by “green” methods) and characterized employing all the techniques available in the authors’ laboratories. Finally, the new material’s photocatalytic activity is assessed most likely following the degradation of a dye molecule such as methylene blue, methyl orange, or rhodamine B by its decreasing optical absorption. A successful synthesis is then defined by the observation of a more rapid degradation achieved by the newly synthesized photocatalyst in comparison to some reference material. Important details of the experimental conditions employed during the latter studies can in most cases not be found in the corresponding publication, that is, the emission spectrum of the illumination system, the absorbed vs the scattered light, the pH, the ionic strength, the reaction products and intermediates, the

turnover number, and so on. In any case the mechanistic studies concerning the underlying photocatalytic process have usually not been the authors’ intention.

As the reader of this editorial might already have guessed, my ideas concerning a valuable contribution to the field of photocatalysis that should be published in this journal are quite different. Starting from the light absorption, by the nowadays most frequently employed semiconducting photocatalyst nanoparticles, leading to the generation of charge carrier pairs needed to be separated and transported to the particle’s surface to be able to react with the respective redox systems, and ending with the final formation of stable endproducts following these initial (most likely free radical) reactions, the overall photocatalytic process is indeed extremely complex. Consequently, many crucial features of this process have, despite 45 years of intense research since the groundbreaking work by Fujishima and Honda [2], not been understood or have not even been investigated. Considerable and fundamental scientific controversies currently exist concerning even the fundamental principles of relatively new research topics within the area of photocatalysis, that is, the photoinduced superhydrophilicity of photocatalytic coatings, the plasmonic photocatalysis, the role of photonic crystals, of grafting, of surface and/or bulk doping, and that of sacrificial reagents. Another extremely important topic (in particular also for this journal) concerns the role of (mainly electron transfer and electron-coupled proton transfer) catalysis and its interplay with the respective photocatalyst. I’m pretty sure that this is only “the top of the iceberg” and that I could continue this list of open questions almost infinitely. For example, reliable photochemical data such as quantum yields are as difficult to find as are kinetic constants and thermodynamic properties for photocatalytic systems.

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It is therefore my intention to utilize my new role as Associate Editor of this journal to encourage authors whose work involves studies such as those described above to submit their work for publication herein. I also hope to convince senior and, in particular, junior experts in their fields to contribute Perspective articles to initiate and intensify the scientific discussion in the most precious research areas of photocatalysis, including the solar energy to fuel conversion and the photocatalytic air and water remediation. High quality papers authored by high quality scientists will not only improve my understanding of photocatalysis but also that of

the still growing scientific community in this field. Hence, I am very much looking forward to closely collaborating with all of you in the future.

References

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