Photochemistry research gaining momentum, but tardily

Lately 'photochemistry research' is gaining momentum in India, though internationally it is about five decades old. Our participation in this area can easily be gauged by the number of conferences held every year in this field or related areas of research in the country. Recently a meeting under the title 'Photochemistry and laser chemistry conference' was organized (19 to 21 December) at the Regional Research Laboratory, Thiruvananthapuram. The meeting was the second in the series held at Thiruvananthapuram, where a strong photochemistry group is emerging.

This meeting aimed at bringing a small but carefully chosen group of about 25 photochemists and laser chemists together for an exchange of ideas, thoughts, and initiation of collaborative research in India. Unlike the first meeting held in 1988, this had an international overtone owing to the presence of two Sri Lankan photophysicists and a scientist from E. I. Du Pont, USA.

Some of the highlights of the meeting include talks by O. A. Illeperuma and K. Tennakone (Institute of Fundamental Studies, Kandy, Sri Lanka) on conversion of solar energy to chemical energy using different redox reactions in the presence of semiconductor colloidal catalysts. It was pointed out that some of the earliest attempts in this area were made in India more than 50 years ago[1]. Unfortunately, certain exaggerated claims in the last two decades have generated considerable scepticism about all new results. It was felt that systematic studies in solar-energy conversion would be the obvious way to attract more funding for photochemistry research.

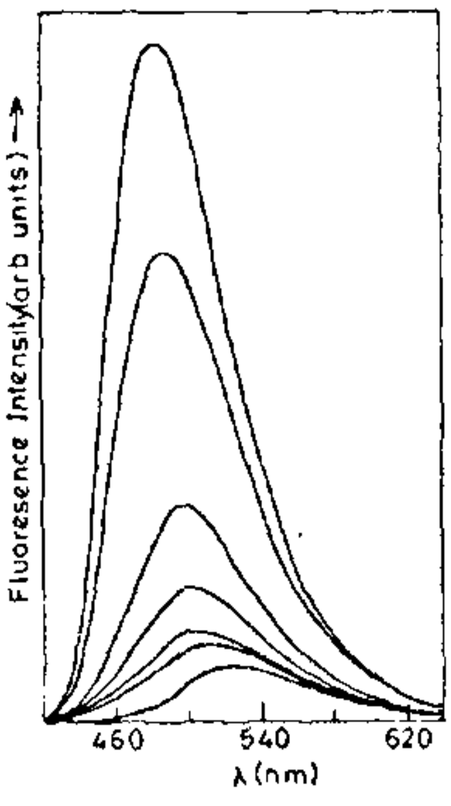
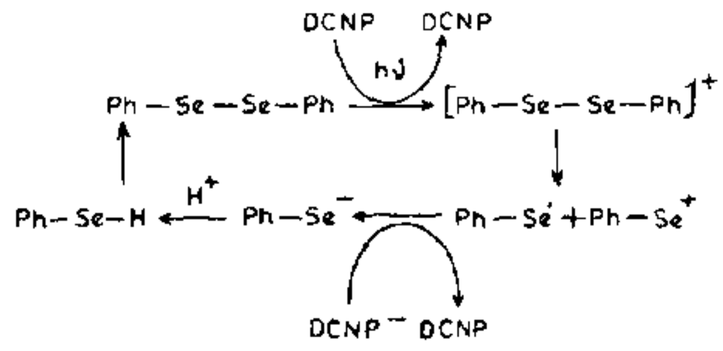


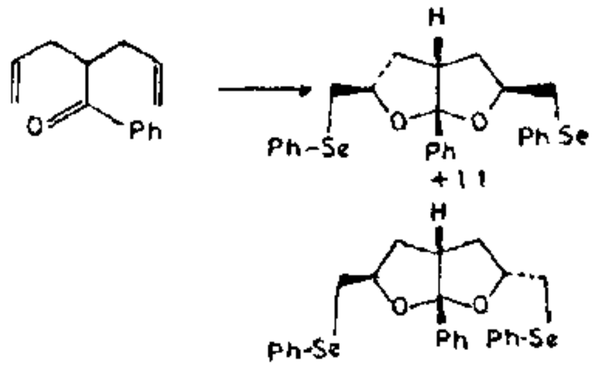
Figure 1. Emission spectra of 7-*N*,*N*-diethylamino-4-trifluoromethylcoumarin in aqueous solutions containing cyclodextrin in different concentrations.

Another talk, on biomedical and technological applications of photochemistry, was presented by G. S. Kumar (Alchemie Research Centre, Thane). The feasibility of three-dimensional imaging or stereolithography using single- or two-photon techniques to prepare artificial polymeric substitutes for human organs was received with awe by the participants.

The remaining presentations emphasized fundamental aspects of photochemistry. Photophysical and photochemical behaviour in microenvironments, be it in micelles, proteins, or in zeolites of different sizes and shapes, generated tremendous interest. V. Ramamurthy (Du Pont, USA) spoke of the heavy-atom effect (modification of triplet lifetimes and phosphorescence by cesium, thallium, etc.) and a novel light-atom effect (appearance of forbidden bands of condensed polycyclic aromatics such as pyrene through coordination by lithium or sodium ions) in zeolites. K. Bhattacharya (Indian Association for the Cultivation of Science, Calcutta) presented results on changes in absorption and emission spectra of coumarin dyes caused by incorporation in different media. A typical spectral change produced by cyclodextrin is shown in Figure 1. Such changes have been used to determine the local polarity in a protein. Other photophysical studies discussed at the conference include triplet–triplet spectral examination in different solvent systems and a time-resolved IR-spectroscopic investigation for the determination of new band systems in organic molecules in their excited states.



Scheme 1.



Scheme 2.

Organic synthesis using photogenerated diselenide radical cation was presented by the only synthetic chemist, G. Pandey (Indian Institute of Chemical Technology, Hyderabad), present at the meeting. The photocatalytic cycle in the presence of 1,4-dicyanonaphthalene (DCNP) is shown in Scheme 1. A typical application in the synthesis of a bicyclic system using this procedure is illustrated in Scheme 2.

A talk on theoretical aspects dealt with electronic-structural features of diradicals or radicaloids involved in intermediate steps in organic photochemical reactions.

Finally, two days of intense lecture and question–answer sessions culminated in a discussion on the current status of photochemistry research in India. Ironically, all the resolutions drawn up two years ago in the first such meeting remained valid, barring a few cosmetic changes. A major concern was the expensive experimental set-ups needed for carrying out modern photochemical research. The advantages (and disadvantages) of having national and/or regional centres as well as targeted research support for active scientists in this area were discussed. As every such meeting should end with an optimistic note, it is hoped that the next few years will see much more participation in photochemistry and laser-chemistry research in this country.

1. *Editor's Note*: Nil Ratan Dhar (1892–1986) carried out early and important researches on photochemical nitrogen fixation at Allahabad University in the 1930s. A full account of his life and work may be found in the *Biographical Memoirs* of fellows of the Indian National Science Academy (1990, vol. 14, 1).

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