S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES
Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Chemical, Biological & Macro-Molecular Sciences

05th October'2021 **4.00PM** **ONLINE**

SPEAKER

Dr. Pradip Pachfule, Assistant Professor, SNBNCBS

TITLE OF THE TALK

Functionalized Covalent Organic Frameworks (COFs) for Photocatalytic Water Splitting and Radical Polymerization

ABSTRACT

Covalent organic frameworks (COFs) are crystalline, highly porous, two- or three-dimensional polymers with tunable topology and functionalities. COFs consisting of inbuilt micropores are getting considerable attention due to their tunable pore sizes, high surface areas, enhanced chemical stabilities and easier large-scale synthesis.1,2 Because of their higher chemical stabilities in comparison to their boron-linked counterparts, imine or β-ketoenamine linked COFs have been utilized for a broad range of applications, including gas storage, heterogeneous catalysis, energy storage devices and proton-conductive membranes.3 We have demonstrated the synthesis of highly porous acetylene (-C≡C-, TP-EDDA) and diacetylene (-C≡C-C≡C-, TP-BDDA) functionalized β-ketoenamine COFs, which are synthesized through the condensation of aryl amines and aldehydes under acid-catalyzed solvothermal conditions (Figure 1).4 These novel COFs have been applied as photocatalyst for hydrogen generation from water. It is shown that the diacetylene moieties have a profound effect, as the diacetylene-based TP-BDDA largely outperforms the acetylene-based TP-EDDA in terms of photocatalytic activity. As a combined effect of high porosity, easily accessible diacetylene (-C≡C-C≡C-) functionalities and considerable chemical stability, an efficient and recyclable heterogeneous photocatalytic hydrogen generation is achieved for TP-BDDA COF holding the diacetylene (-C≡C-C≡C-) moieties. To overcome the challenges about the chemical stability of COFs during the photocatalytic water splitting, we have also prepared the vinylene-linked (-CH=CH-) COFs, which have showed a great promise for water splitting.5 Recently, we have also synthesized two donor–acceptor COFs using electron deficient triazine building block and electron rich thiophene-based linkers.6Considering the utility of donor-acceptor COFs for efficient light absorption, we have successfully employed these crystalline and porous COFs for heterogeneous visible light induced radical polymerization, showing the utility of COFs in photochemistry.

HOST FACULTY

Dr. Suman Chakrabarty

Associate Professor & Seminar Coordinator, CHEMICAL, BIOLOGICAL & MACRO-MOLECULAR SCIENCES

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