Ph.D. Open Seminar

Title of Thesis: **Conjugated porous organic polymers: fluorescence-based sensing, photocatalysis and energy storage**

Speaker: Mr. Sujoy Bandyopadhyay (Thesis Supervisor: **Dr. A Patra**) Roll No.: **1220223**
Date: **Sep. 11, 2017** Time: **10:00 – 11:00 AM** Venue: **L3**

Abstract

Starting from the grand old activated charcoal to zeolites, porous materials have been utilized for environmental and technological benefits for mankind. Of late, porous organic polymers (POPs) have emerged as a new class of functional materials with applications ranging from gas adsorption, gas/liquid separations, catalysis, light harvesting to chemo/biosensing.[1] A combination of porosity and π-electron conjugation leads to the development of a new field of conjugated porous organic polymers (CPOPs). In this context, we have designed a new core of tetraphenyl-5,5-dioctyl-cyclopentadiene (TPDC), and fabricated CPOPs in the form of solid, soluble in organic solvents and nanoparticles. The soluble CPOP and the aqueous dispersion of nanoparticles employed for nitroaromatics sensing by amplified fluorescence quenching.[2-3] Tunable surface area and fluorescence were achieved in TPDC-based polymers by varying the comonomers and polymerization conditions.[4] Mesoporous to ultra-microporous CPOPs with surface area 73 to 1010 m^2g^{-1} were fabricated using 4,4-difluoro-4-bora-3a,4a-diaza-s-indacenes (BODIPY) core and explored for catalytic photo-oxidation of thioanisol.[5] Further, the systematic investigations with a series of heteroatom containing CPOPs led to the construction of pyrene and phenyl diamine based CPOP with specific capacitance ~300 Fg^{-1} at 1 mv s^{-1} scan rate.[6] Addressing the cardinal issue of solution processability, a general design principle is also presented in the thesis with a special emphasis on carbazole-BODIPY based CPOPs for visible-light-driven reactive oxygen species (ROS)-mediated metal-free organic transformation.[7]

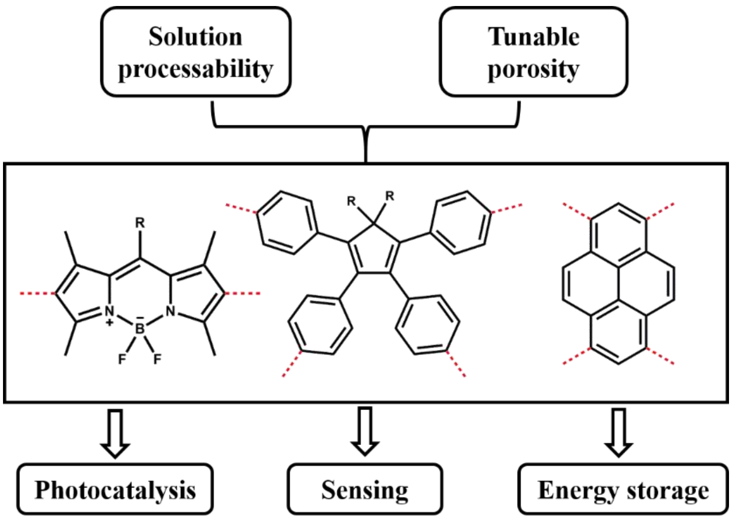

Figure 1. The schematic illustration of multifunctional applications of CPOPs.

References:

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2. Bandyopadhyay, S.; Pallavi, P.; Anil, A. G.; Patra, A., *Polym. Chem.* **2015**, *6*, 3775.
3. Deshmukh, A.; Bandyopadhyay, S.; James, A.; Patra, A., *J. Mater. Chem. C* **2016**, *4*, 4427.
4. Pallavi, P.; Bandyopadhyay, S.; Louis, J.; Deshmukh, A.; Patra, A., *Chem. Commun.* **2017**, *53*, 1257.
5. Bandyopadhyay, S.; Anil, A. G.; James, A.; Patra, A., *ACS Appl. Mater. Interfaces* **2016**, *8*, 27669.
6. Bandyopadhyay, S.; *et al.* (Manuscript under preparation).
7. Bandyopadhyay, S.; *et al.* (Manuscript under preparation).