**Functionalized Nanoporous Carbon and Nitride Based Materials for Energy and Environmental Applications**

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Highly ordered nanoporous carbon nitrides and their hybrids with large surface areas and uniform pore diameters are interesting materials and exhibit highly versatile structural and excellent physicochemical properties which find them applications in diverse fields such as metal free catalysis, photocatalytic water splitting, energy storage and conversion, gas adsorption, separation, and even sensing. One of the unique characteristics of these materials is that they exhibit both semiconducting and basic properties which make them as excellent platforms for the photoelectrochemical conversion and sensing of molecules such as CO2 and the selective sensing of toxic organic acids [1-6]. Semiconducting features of these materials are finely controlled by varying the nitrogen content or local electronic structure of the MCN. In this talk, I will present the preparation, structural and morphological control, and the functionalization of highly ordered and graphitic carbon nitride materials with tunable nitrogen contents. I will present various methods including soft and hard templating approaches coupled with the polymerization of different aromatic and/or aliphatic carbon and high nitrogen containing molecular precursors that have been adopted for the fabrication of carbon nitrides with tunable chemcial composition and structures. Much focus will be given to the structural determination of these novel materials with unique chemical structure. The relation between the structural parameters and the performance of these materials in various applications including catalysis, sensing, and carbon capture and energy storage will be demonstrated [7-11]. In the second part of the talk, the fabrication of various nanoporous films including carbons, nitrides, semiconducting nanostructures, and biomolecules with tunable macroporosity, thickness, and morphology and their applications in sensing of different toxic molecules will be presented [12-16].

**References**

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