

## ***BUILDING POROSITY IN POLYMERS: HOW AND WHY?***

*S. Sivaram,  
CSIR Bhatnagar Fellow  
A201, Polymers and Advanced Materials Laboratory  
National Chemical Laboratory,  
Pune-411 008, INDIA.*

*Tel: 0091 20 2590 2614  
Fax: 0091 20 2590 2615  
Email: [s.sivaram@ncl.res.in](mailto:s.sivaram@ncl.res.in)*

### **ABSTRACT**

Porosity is a profound and, yet, ubiquitous concept that is inherent in all materials, both, natural and synthetic. Biomaterials (skin, alveoli in the lungs), inorganic frameworks (zeolites, carbon, silica, clay), organic frameworks (supramolecular assemblies), plant materials (bamboo) and synthetic polymer membranes (water desalination membranes, kidney dialysis membrane) are all notable for their exquisite porous architectures which are critical to its structure and functions.

Creating porosity of well defined sizes and distribution in polymers has been a subject matter of intense study. Polymers can possess micropores (< 2 nm), mesopores (2-50 nm) or macropores (>50 nm). Porous polymer materials find many applications in biomaterials, energy conversion/storage technologies and separation science and technology.

Porosity in polymers can be created either during its synthesis or by modifying preformed dense polymers by techniques, such as, phase inversion, templating, self assembly and electrospinning.

This lecture will present an overview of challenges encountered in building porosity in polymers. Work currently in progress in author's laboratory in the preparation of porous polymers will be presented with special focus on energy conversion and storage applications.