

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Control of Porosity in Ladder Polymers by Solvent-induced Aggregation. MICHAEL BRADY, ERI GAMO, CHENG WANG, Lawrence Berkeley National Laboratory, YAN XIA, Stanford University — Porous polymers hold promise as materials for gas absorption, membranes, and organic electronics. In all of these applications, attaining in-plane ordering of backbones and thus porous free volume impacts the ability to adsorb gas, selectively filter molecules, and conduct charges. In this work, hard and soft x-ray scattering and soft x-ray spectroscopy are of focus to study the pore structure, induced by the solution-driven aggregation of ladder polymer thin films made of LP-1 and LP-2. Using GISAXS and AFM it is shown that thermal annealing drives the growth of crystallites in thin films. Due to the completely *sp²* nature of the ladder polymer backbones, it is expected that backbones are extremely stiff and thus preventing them from packing once left in a metastable state following casting. Therefore, the combination of GIWAXS and GISAXS will be shown to be critical in correctly understanding how pores develop in this ~ 700 m²/g sorbent (N₂). Finally, application in CO₂/N₂ separation membranes towards carbon sequestration will be presented that show gas selectivity is achieved through heteroatom incorporation and polymer blending. In this talk, focus will be placed on state-of-the-art x-ray scattering and spectroscopy, highlighting the importance of chemically sensitive structural information enabled by the combination of spectroscopy and scattering at play with the use of resonant soft x-rays.

Michael Brady
Lawrence Berkeley National Laboratory

Date submitted: 10 Nov 2016

Electronic form version 1.4