

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Tunable morphologies from charged diblock copolymers MONOJOY GOSWAMI, BOBBY SUMPTER, Oak Ridge National Laboratory — Molecular Dynamics (MD) simulations are carried out to understand the physical aspects of different bulk morphologies formed in charged diblock copolymers. It has been seen that the bulk morphologies formed by charged block copolymers, 75 vol % fluorinated polyisoprene (FPI) - 25 vol% sulfonated polystyrene (PSS) with 50% sulfonation are substantially different from their diblock counterparts. In this study we show how the bulk morphologies change from the uncharged diblock counterparts and also how morphology can be tuned with volume fraction of the charged block and with a change in dielectric constant. A physical understanding based on the underlying strong electrostatic interactions between the charged block and counterions is obtained. The 75/25 diblock shows hexagonal morphologies with the minority blocks (PSS) forming the continuous phase due to charge percolation and the FPI blocks arranged in hexagonal cylinders. Some long-range order can be sustained even by changing the dielectric of the medium. Diverse and atypical morphologies are readily accessible by simply changing the number distribution of the charges on PSS block.

Monojoy Goswami
Oak Ridge National Laboratory

Date submitted: 10 Mar 2011

Electronic form version 1.4