Department of
Chemical and Environmental Engineering

2014—2015 Seminar Series

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Sanat Kumar

Professor and Department Chair
Department of Chemical Engineering
Columbia University

Nanocomposites with Grafted Nanoparticles

A recurring challenge in the field of nanocomposites is to control the spatial distribution of nanoparticles (NPs) in a polymer matrix. This issue is of critical importance since it is well-established that certain nanoparticle dispersion states are necessary to optimize a desired property of a polymer nanocomposite. I focus on one particular approach to controlling nanoparticle spatial dispersion, the use of polymer-grafted nanoparticles. In the case where the NP and the grafted polymer chains energetically “dislike” each other, we have an architecture akin to a microphase separated block copolymer. Analogous to these “surfactants” these NP also assemble into a range of morphologies, thus giving us the unprecedented ability to control the NP dispersion state. We first focus on the factors controlling this assembly and use this knowledge to consider the utility of these materials in creating membranes which have the potential to revolutionalize the separation of hydrocarbons and in carbon sequestration.