## 368f Impacts of Phase Morphology on Polymer Blends Foaming Using Supercritical CO2

*Xiangmin Han, Jiong Shen, Guojun Xu, and L. James Lee*

The use of polymer blends in foam processing provides a high degree of freedom to manipulate the foam structures and properties. However, up to date, little work has been addressed on the influence of the phase morphology on the final foam morphology. In this study, we used polystyrene(PS)/poly(methyl methacrylate(PMMA) as the blend system and supercritical CO2 (scCO2) as the blowing agent. Our results reveal a very interesting correlation: the larger the dispersed domain (PMMA) size in the blend, the smaller the final bubble size in the foam.

When incorporating nanoclay into this blend system, the location of nanoclay seems to determine their major functionality: nucleants or merely viscosity enhancer? Once fixed within the PMMA phase, nanoclay, even with exfoliated dispersion, didn't show obvious nucleation effect on the blend foaming. The correlation between the domain size and the bubble size follows the same curve as the pure PS/PMMA system. However, once fixed at the PS-PMMA interface, nanoclay exhibited a noticeable enhancement on the bubble nucleation. The same trend between domain size and bubble size still holds true for this system. However, under the same domain size, blends with nanoclay at the interface show much higher cell densities and smaller cell sizes.

Our results were rationalized by a postulation: in PS/PMMA blends, the minor phase (PMMA) mainly serves as the gas reservoir to supply CO2 to the PS domain. The ultimate foam morphology thus greatly depends on the interplay between the bubble nucleation, bubble growth and an interfacial mass transfer of CO2. A conceptual model of this complicated process is still under investigation.