Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Size Controlled Polymer Coated Nanoparticles as Efficient Compatibilizers for Polymer Blends T. KWON, T. KIM, F. ALI, D.J. KANG, B.J. KIM, KAIST, J. BANG, Korea Univ., W.B. LEE, Sogang Univ. — Polymer-coated gold nanoparticles (Au) with controlled size and surface were successfully synthesized and applied to tailor the structures and properties of polytriphenylamine (PTPA) and polystyrene (PS) blends. Two different polymer-coated Au NPs with sizes of 5.9 nm (Au1) and 20.7 nm (Au2) were designed to be thermally stable above 200 °C and neutral to both PS and PTPA phases. Hence, both Au NPs localize at the PS/PTPA interface and function as compatibilizers in the PS/PTPA blend. To show the compatibilizing effect of the particles, the morphological behaviors of PS/PTPA blends containing different particle volume fraction of Au NPs were observed using cross-sectional TEM, and for quantitative analysis, the size distribution of PTPA droplets in the PS matrix was obtained for each sample. The number-average droplet diameter (Dn) of the PTPA domain in the blend was dramatically reduced from 1.4 μm to 500 nm at a small volume fraction of 1.0 vol% Au1. The same trend of decreasing Dn was also observed with the addition of larger Au2, but a higher volume fraction was required to obtain the same amount of reduction in the PTPA droplet size. To demonstrate the effectiveness of Au NPs as compatibilizers, PS-b-PTPA block copolymers were also synthesized and used as compatibilizers.

T. Kwon
KAIST

Date submitted: 02 Dec 2011 Electronic form version 1.4