

## Effect of particle size, dispersion, and particle–matrix adhesion on W reinforced polymer composites

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Received: 16 October 2012 / Accepted: 8 February 2013 / Published online: 1 March 2013  
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**Abstract** W dispersed mixed polymers of ethylene propylene monomer and high density polyethylene were prepared by means of a twin-screw extruder by the conventional technique using a co-rotated two-roll mill. The W nanoparticles used as filler were prepared by pulse wire evaporation then coated with low-density polyethylene (LDPE) as polymeric surfactant. Surface treatment of the nanoparticles with LDPE was conducted to enhance the wettability and lubrication of the fillers in the polymer matrix. According to SEM images and mechanical properties, dispersion of W/LDPE nanoparticles in the polymer matrix was homogeneous, and adhesion of the nanoparticles to the matrix was strong. The polymer nanocomposites had better mechanical properties than those containing dispersed micro-W powder. The  $\gamma$ -ray attenuation factor of nanofiller-reinforced composites was substantially enhanced compared with that containing micro filler.

**Keywords** Metal–polymer composite · Radiation shielding · LDPE-coated nanoparticle · Nanoparticle dispersed polymer