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Polymer/inorganic nanocomposites with prescribed morphologies[1] E. MANIAS, M.J. HEIDECKER, J. ZHANG, G. POLIZOS, Materials Sci & Eng, Penn State U — Despite the proliferation of polymer/inorganic nanocomposites in academic research and the commercialization of tens of products based on such materials, their true potential still remains largely untapped. One of the major hurdles in this endeavor is to capitalize on the novel properties afforded by a true–'nano'morphology, *i.e.*, beyond simple nanoparticulate dispersions and towards prescribed filler/phase arrangements and tailored filler–polymer interfaces. We comparatively present nanocomposites with prescribed *nano*morphologies, which can be made in large, industrial-scale, quantities (e.g. composites with spatially arranged fillers: such as shear–aligned fillers in blown PE films and filler-induced compatibilization of PC/PET blends). We discuss the fundamental mechanisms of achieving the prescribed *nano*morphologies and the related novel functionalities. In particular, we emphasize on extraordinary properties achieved by simultaneous control of the composite morphology and of the polymer–filler interface, such as an impressive toughening effectin PC/PET nanocomposites, and PE nanocomposites with a predetermined tensile strength by tailoring the polymer–filer interfacial adhesion.

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Evangelos Manias
Penn State U

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