Abstract Submitted
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The role of nanoparticle synergies in modifying the thermal properties of biodegradable polymer blends[1] KAI YANG, SHAN HE, SUNY-Stony Brook, RACHEL DAVIS[2], Smithtown High School East, MIRIAM RAFAILOVICH, SUNY-Stony Brook, TAKASHI KASHIWAGI, National Institute of Standards and Technology — Most of thermoplastic polymers are brittle, when sufficient amounts are added to get flame retardant properties.Furthermore, melt-blending starch with other biodegradable polymers is difficult since very few polymers are compatible with starches.We have developed a new nanoparticles where resorcinol diphenyl phosphates (RDP) is used to modify the surface energy, allowing the particles to be dispersed within polymer.When multiple types of particles share the same coating,they can be melt blended simultaneously and synergies can be achieved, imparting properties to the nanocomposite, which cannot be achieved by any single additive. Here we show that RDP modified starch, can be extruded together with the biodegradable polymers,Ecoflex and polylactic acid,to produce flame retardant nanocomposites which can pass the UL-94-V0 test.TEM images of the blend show that the RDP-coated starch particles were well dispersed within the polymer matrix providing the flame retardant properties,while the RDP clays are reducing the interfacial tension and contributing to compatibilization. Nanomechanical measurements of the chars remaining after cone calorimetric measurements indicate that maintaining flexibility of the chars may be an additional factor in achieving good flame retardant properties.

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