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Research on Plastic/Elastomeric Nanoparticle/Inorganic Nanoparticle Ternary Nanocomposites

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A new process for making polymer nano-composite with lower cost and higher toughness will be introduced in this presentation. The ultra-fine full-vulcanized powdered rubber (UFPR) with particle size about 100nm has been used to help inorganic nanoparticles disperse in polymer matrix. The UFPR, prepared by combined technologies of irradiation and spray drying, has special microstructure, very high crosslinking degree on the surface and moderate crosslinking degree in the inner parts. Therefore, the UFPR itself can be easily dispersed in plastic matrix and also can help inorganic nanoparticle disperse in polymer matrix. The inorganic nano-particle, such as clay, nano- CaCO_3 and nano- $\text{Mg}(\text{OH})_2$ without surface treatment, are dispersed or exfoliated well in polymer matrix in these new ternary polymer nanocomposites; therefore, the nanocomposites with low cost have balanced toughness and stiffness.

Polymer nanocomposites continue to generate much interest since they exhibit superior properties relative to conventional polymer composites. Some novel polymer nanocomposites of plastic/unmodified inorganic nanoparticle/ultra-fine full-vulcanized powdered rubber (UFPR) will be introduced in this speech, such as nylon/unmodified clay/UFPR, PVC/unmodified nano- CaCO_3 /UFPR and nylon/unmodified nano-Magnesium hydroxide/UFPR nanocomposites etc. All these nanocomposites with low cost have advanced properties.