

## Nanocomposites and nanomaterials

### New nanocomposites of polystyrene with polyaniline doped with laurylsulfuric acid

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Intrinsically conducting polymers (ICP) attract considerable attention due to their unique physical and chemical properties, which allow their applications in different high-tech fields. Among ICP polyaniline (PANI) is often preferred for some applications due to good conductivity, high stability, ease of synthesis and treatment, low price. However, poor mechanical properties, limited solubility and meltability cause its low processibility. The good method to minimize these drawbacks is formation of PANI composites with common polymers. One of the most effective methods to produce this approach is aniline polymerization of aniline in a presence of other polymer nanoparticles. This approach facilitates formation of core-shell nanocomposites where the shell is formed of PANI. Processing of these nanocomposites by dissolution in a solvent common for the both components or by extrusion allows preparing highly conductive composite materials with small quantity of the PANI component.

Our work was concentrated on obtaining and investigation of nanocomposites of PANI with polystyrene (PS). The latter was chosen as a second component of the nanocomposites due to excellent physical and mechanical properties. The latexes, containing PS nanoparticles, were prepared by microemulsion polymerization of styrene in water media. The nanoparticle sizes (60-130 nm) were determined by dynamic light scattering. In turn, the PS/PANI nanocomposites were synthesized by chemical oxidative polymerization of aniline in the latex media. Using pH and open-circuit potential monitoring of the aniline polymerization, we revealed the effect of the PS nanoparticle size on kinetics of this process. The composition of the nanocomposites was studied by UV-Vis and FTIR spectroscopy and their morphology was characterized by transmission electron microscopy. It was found that these nanocomposites are conductive and have high thermal stability that suggests their applications as antistatic and sensor materials.