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Short Communication

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Preparation of Conductive Polyaniline/Metacryloyl Modified-Poly (Vinyl Alcohol) Thin Films and Investigation of their Usability in the Reduction of Morphologically Different Ag Particles

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Abstract:

One of the most electrically conductive conjugated polymers, polyaniline (PAni), has increasingly drawn the attention of the researchers due to its excellent tunable electrical properties and versatile functional groups such as amines and imines, which can form strong interactions such as H bonds with its composites. However, it's processing penalties such as being brittle when it is subjected to pellet form, difficult solubility in environmentally friendly solvents such water limit its usability in potential application areas. For this reason, many attempts have been made in literature. Among them, preparation of its films using soft commercial polymers such as poly(vinyl alcohol) (PVA) is promising in terms of imparting desired properties of the polymer such as high process ability, flexibility and hydrophility to the PAni, without losing its properties. In this work, we prepared a conductive composite film, from PAni and a methacryloyl groups introduced PVA polymer in a few facile steps. First, the PVA polymer was modified with glycidyl methacrylate in the presence of N,N,N,N-tetramethylethylenediamine (TEMED) as catalyst at 60 °C in DMSO and then casted as films. Second, aniline was polymerized on PVA-gma film surface with APS oxidant in 1M HCl. The effect of some conditions such as concentration of PVA-gma polymer (g/100 mL) and concentration of aniline (M) were investigated on PAni (%) content and surface resistivity of the film. It was observed that the surface resistivity of the thin and almost transparent PAni/PVA-gma films (containing 17.5% of PAni) reached to 1000 Ω/cm2. The composite films were characterized with various techniques. The as-prepared films were used as soft templates in the reduction of Ag particles, after subjecting the films to the ammonia de-doping and different sulfonic acids re-doping processes. The changing morphology, particle size and decoration intensity of the Ag particles were also monitored with SEM technique.

Biography:

Meryem Kalkan Erdogan is a Research Assistant in the Department of Chemistry, Faculty of Science, Ankara University. She has completed her MSc degree in 2011 and PhD degree in 2017, respectively. Her research interests are preparation of electrically conductive composites from conductive polymers with various materials such as textiles, developing materials for electromagnetic interference shielding and surface properties of noble metal nanoparticles.