Abstract Submitted
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Plasma – enhanced dispersion of metal and ceramic nanoparticles in polymer nanocomposite films[1] PAUL MAGUIRE, University of Ulster, YAZI LIU, Nanjing University, China, SADEGH ASKARI, JENISH PATEL, MANUEL MACIA-MONTERO, SOMAK MITRA, University of Ulster, RICHAO ZHANG, Nanjing University Jinling College, China, DAN SUN, Queen's University Belfast, DAVIDE MARIOTTI, University of Ulster — In this work we demonstrate a facile method to synthesize a nanoparticle/PEDOT:PSS hybrid nanocomposite material in aqueous solution through atmospheric pressure direct current (DC) plasma processing at room temperature. Both metal (Au) and ceramic (TiO2) nanoparticle composite films have been fabricated. Nanoparticle dispersion is enhanced considerable and remains stable. TiO_2/polymer hybrid nanoparticles with a distinct core shell structure have been obtained. Increased nanoparticle/PEDOT:PSS nanocomposite electrical conductivity has been observed. The improvement in nanocomposite properties is due to the enhanced dispersion and stability in liquid polymer of microplasma processed Au or TiO_2 nanoparticles. Both plasma induced surface charge and nanoparticle surface termination with specific plasma chemical species are thought to provide an enhanced barrier to nanoparticle agglomeration and promote nanoparticle-polymer bonding. This is expected to have a significant benefit in materials processing with inorganic nanoparticles for applications in energy storage, photocatalysis and biomedical sensors.

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