

Abstract Submitted
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One pot electrochemical synthesis of polymer/CNT/metal nanoparticles for fuel cell applications. LAKSHMAN VENTRAPRAGADA, JINGYI ZHU, MEHMET KARAKAYA, RAMAKRISHNA PODILA, APPARAO RAO, Clemson University, CLEMSON NANOMATERIALS CENTER TEAM — Carbon nanotubes (CNTs) have become a key player in the design of materials for energy applications. They gained their popularity in industrial and scientific research due to their unique properties like excellent conductivity, high surface area, etc. Here we used chemical vapor deposition (CVD) to synthesize two types of CNTs namely, helically coiled CNTs and vertically aligned CNTs. These CNTs were subsequently used to make composites with conducting polymers and metal nanoparticles. One pot electrochemical synthesis was designed to electropolymerize aniline, pyrrole etc. on the surface of the electrode with simultaneous deposition of platinum and gold metal nanoparticles, and CNTs in the polymer matrix. The as synthesized composite materials were characterized with scanning electron microscope for surface morphology and spectroscopic techniques like Raman, UV-Vis for functionality. These were used to study electrocatalytic oxidation of methanol and ethanol for alkaline fuel cell applications. Electrodes fabricated from these composites not only showed good kinetics but also exhibited excellent stability. Uniqueness of this composite lies in its simple two step synthesis and it doesn't involve any surfactants unlike conventional chemical synthesis routes.

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