

Title: Study of electrical and dielectric properties of conducting polymers

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Abstract: Charge transport in polyaniline (PANI) and polypyrrole (PPy) was studied in respect to various oxidants, dopants, morphology, and other modifications in their synthesis. The mechanism of transport was discussed in the framework of combination of several models characteristic for disordered solids due to inherent heterogeneous structure of conducting polymers. Effect of drying on conductivity was studied and the long-time limit was explained with the diffusion-based model for bulk materials. For PPy nanotubes stability in strong alkaline media and aging were studied by AC and DC techniques. While conductivity of naturally aged samples after two years remained in the same order of magnitude, after exposure to alkaline media or accelerated aging at high temperatures, conductivity decreased several orders of magnitude. Degraded material exhibited strong disorder and the transport model was completely changed. Despite severe treatment electrical properties were still comparable to other as-prepared materials. Finally, an application example as ammonia sensor, the response of PANI reprotonated with various sulfonic acids was studied with the best performance achieved for MSA.

Keywords: conducting polymers, charge transport, electrical conductivity, aging