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SYNTHESIS AND ELECTRON TRANSPORT PROPERTIES OF SOME NEW 4,7-PHENANTHROLINE DERIVATIVES IN THIN FILMS

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Abstract

Temperature-dependent d.c. electric conductivity of some recently synthesized organic compounds, 4,7-phenanthroline derivatives is studied. Thin-film samples (d=0.34-0.63 μm) spin-coated from dimethylformamide solutions onto glass substrates have been used. Organic films with reproducible electron transport properties can be obtained if, after deposition, they are submitted to a heat treatment within temperature range of 298–523K. Examined organic compounds in thin films are polycrystalline and display typical *n*-type semiconductor behavior. The activation energy of d. c. electric conduction ranges between 0.09 and 0.46 eV and is influenced by nature of substituents, degree of conjugation systems and packing capacity of compounds. In the higher temperature range (T>433 K), the electron transport in examined compounds can be interpreted in terms of the band gap representation model, while in the lower temperature range, the Mott's variable-range hopping conduction model was found to be appropriate. Some of the investigated compounds hold promise for thermistor applications.

Key words: chemical synthesis, electric conductivity, organic compounds, thin films

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