On the direct current electric conductivity and conduction mechanism of some stable disubstituted 4-(4-pyridyl)pyridinium ylides in thin films

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Temperature-dependent d.c. electric conductivity of some recently synthesized organic compounds, stable disubstituted 4-(4-pyridyl) pyridinium ylides, is studied. Thin-film samples (d = 0.100.80 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 297 - 527 K.

The studied polycrystalline compounds exhibit typical n-type semiconductor behavior. The activation energy of the electric conduction ranges between 0.59 and 0.94 eV.

Some correlations between semiconducting parameters and molecular structure of the organic compounds have been discussed. In the higher temperature range (T > 400 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.

Résumé en anglais

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