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Nanostructured Organic Crystals as Prospective Thermoelectric Materials for Infrared Sensors

Abstract

In this paper we investigate the prospective of use of some nanostructured organic crystals as efficient thermoelectric material for infrared biosensors. Nowadays, the infrared sensors are widely implemented in thermal imaging system, night vision systems and different personal or clinical devices for health monitoring. A thermoelectric sensor consists of thermocouples of *n*-type and *p*-type materials with high electrical conductivity. The sensitivity of the sensor is determined mainly by the thermoelectric power factor of the material. Quasi-one dimensional organic crystals of tetrathiotetracene-iodide, TTT2I3 of *p*-type and tetrathiotetracene—tetracyanoquinodimethane, TTT(TCNQ)2 of *n*-type were proposed earlier as prospective materials with high thermoelectric power factor. In the following, the electrical conductivity, the Seebeck coefficient and the thermoelectric

power factor of TTT2I3 crystals are calculated numerically as a function of temperature. The optimal values of charge carrier concentration in order to achieve a high thermoelectric power factor are determined.