SYNTHESIS AND PROPERTIES OF PHENOTHIAZINE AND CARBAZOLE-BASED DERIVATIVES FOR OPTOELECTRONIC APPLICATIONS

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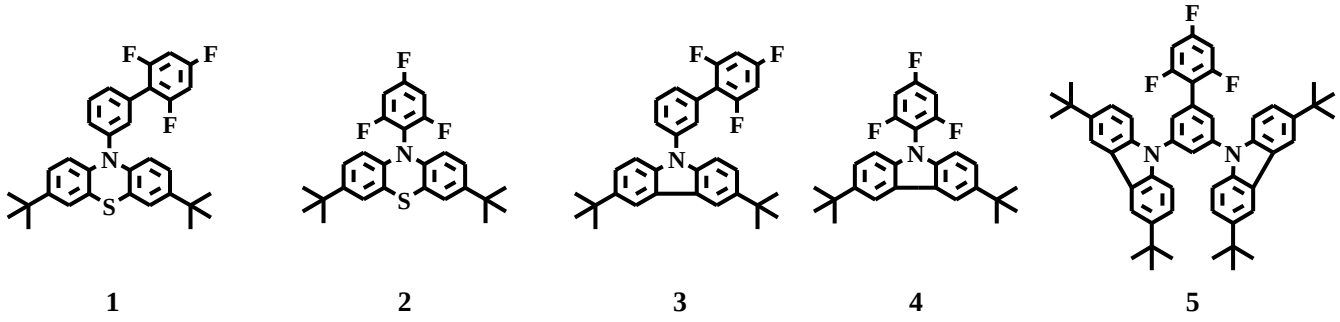
Electroactive organic compounds are used as light-emitting materials for optoelectronic devices such as light-emitting diodes, solar cells and electrophotographic photoreceptors [1, 2]. Phenothiazine and carbazole-based compounds have advantageous characteristics such as thermal and electrochemical stability, high electron/hole conductivity and efficient luminescence [3, 4]. Due to these properties phenothiazine and carbazole fragments were chosen for this study. The synthesis and properties of phenothiazine and carbazole derivatives bearing trifluorophenyl-acceptor group **1**-**5** are presented (Fig 1). The materials **1**-**5** were synthesized by Ullman-coupling and Suzuki-coupling methods.



1 **2** **3** **4** **5**

Fig. 1. Structures of **1**-**5**.

The structures of the synthesized compounds were proved by ^{1}H and ^{13}C NMR spectroscopy and mass spectrometry.

The behavior on heating of compounds **1**-**5** was studied by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA) under a nitrogen atmosphere. A temperature ranging from 201°C to 369 °C of compounds **1**-**5**. Compound **5** demonstrates the highest thermal stability (369 °C).

The ionization potentials of the derivatives were estimated by cyclic voltammetry (CV). They were found to be comparable and ranged from 4.85-5.25 eV. The electron photoemission spectra of layers of the derivatives showed the ionization potentials of 5.84-6.19 eV.

The fluorescence emission wavelength of compounds is in the region of green-blue light. Triplet energy values ranging from 2.58 eV to 2.88 eV were determined from phosphorescence spectra. Because of that the materials can be used as matrix for blue emitters [5].

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