

Toruń, 25.09.2024

city, date

Full name of doctoral student: Alicja Anna Zielińska

DOCTORAL DISSERTATION ABSTRACT

Scientific discipline: chemical sciences

Title of the doctoral dissertation: Synthesis and investigation of the properties of heterocyclic thermally activated delayed fluorescence (TADF) emitters in organic light-emitting diodes (OLEDs)

Doctoral dissertation abstract: The aim of the doctoral thesis was to synthesize small-molecule organic compounds that emit radiation by thermally activated delayed fluorescence (TADF) and to study their photoluminescent properties, as well as in light-emitting diodes. An important aspect was the evaluation of the obtained results in terms of application in the optoelectronic industry. Fourteen emitters were synthesized as part of the work, and full characterization of photophysical and electrochemical properties and thermal analyses were performed. Of the synthesized compounds, twelve showed TADF properties, confirmed after performing time-resolved spectroscopic studies. Based on the analysis of the obtained results, organic light-emitting diodes (OLEDs) were produced by the PVD method for eight compounds, for which full current-voltage characteristics were performed. OLEDs emitted radiation in blue and green region, and the operation of the diodes was also tested in terms of selecting the appropriate guest-host system. For most compounds, the external quantum yield was at a satisfactory level (above 15 %), and for one compound, the yield exceeded 30 %.