



Design and synthesis of novel indole derivatives with aggregation-induced emission and antimicrobial activity

Mostafa Sayeda, Osama Younis, Reda Hassanien, Mostafa Ahmed, Ahmed A.K. Mohammed, Adel M. Kamal, Osamu Tsutsumi

Abstract:

New heterocyclic compounds containing indolylthienopyrimidine have been synthesized and their structures were confirmed using elemental and spectral analyses. The photophysical measurements demonstrated that some selected compounds display aggregation-induced emission (AIE) activity with high fluorescence efficiency in the solid state (ex. 21.4%). From the density functional theory (DFT) calculations, emission lifetime, and decay constants, it was found that some functional groups that can form effective intermolecular interactions between the aggregated molecules can open new channels for the radiative relaxations and improve the emission efficiency. Moreover, these materials can emit strongly at temperatures higher than 200 °C. Also, the antimicrobial activity and thermal behavior have been investigated and the compounds showed strong biological activities and high thermal stabilities (ex. 295 °C as the 5% weight loss). Since these materials have both the AIE and antimicrobial activity, they can be considered as expected candidates for biosensors, biomedical imaging, and to image bacteria.

Keywords:

IndoleThienopyrimidinePhotoluminescenceAggregation-induced emissionDFT calculations

Published In:

Journal of Photochemistry & Photobiology A: Chemistry , 383 , 111969-111979