Secteur des Sciences et Technologies

Invitation à la soutenance publique de thèse de

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Master of Science (chemistry)

Pour l'obtention du grade de Docteur en sciences

« Exploring merocyanine forms of spiropyrans in the solid state - A crystal engineering approach »

qui se déroulera

le mardi 17 décembre 2019 à 15h

Auditoire LAVO 51

Place Louis Pasteur, 3

1348 Louvain-la-Neuve

Jury members :

Prof. Tom Leyssens (UCLouvain), supervisor
Prof. Yann Garcia (UCLouvain), chairperson
Prof. Yaroslav Filinchuk (UCLouvain), secretary
Dr. Koen Robeyns (UCLouvain)
Prof. Johan Wouters (UNamur, Belgium)
Prof. Martin Schmidt (Goethe University, Germany)
Prof. Benoît Champagne (UNamur, Belgium)

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Spiropyrans are photochemically active compounds exhibiting their photochromic character primarily in solution. The breaking of the central spiro C-O bond upon irradiation with UV-light leads via a ring-opening isomerization to the open-form isomer called merocyanine. The isomers have strongly different absorption characteristics easily observable by their altered color. However, due to high steric demand during the isomerization the photochromic properties are not readily accessible in the solid state. Accessing the merocyanine in the solid state can open up a pathway for multiple color-based applications. Up to now, this was solely achieved by chemical modification and by introducing complex host materials. A crystal engineering approach as presented in this work provides a promising alternative to explore the merocyanine isomer in the solid state. The modification of the crystal structure is realized by introducing a second component in order to stabilize the merocyanine form and prevent the reverse isomerization. In doing so, several inorganic and organic acids were applied in an acidochromic approach successfully leading to the highly colored solid materials. The variety of accessible solids of the target molecule is expanded by metal-organic complexation and salification with metal salts. Intermolecular interactions such as hydrogen and halogen bonding support the tuneability of the chromic properties in the solid state. Multi-component spiropyran/merocyanine materials are obtained by isothermal solvent evaporation and by mechanochemical synthesis. A full characterization is provided by single crystal/powder X-ray diffraction, solid state absorption spectroscopy, thermogravimetric analysis (TGA) and nuclear magnetic resonance (NMR). The results reveal how the tools of crystal engineering can be successfully applied to access the photochromic properties of spiropyrans in the solid state.