MX-OSMOPED: Matériaux semiconducteurs MXene/organique hybrides pour des dispositifs électroniques à mobilité élevée

Main area: BSR05_Inks for printing stable GRM-based semiconducting thin films
Keywords: MXenes, organic semiconductor, thin film transistors, mobility,
Duration (months): 36
Total project funding: € 866.850

Abstract

MX-OSMOPED aims at blending MXenes and organic semiconductors to form semiconducting inks that can be printed onto flexible to fabricate organic thin film transistors (OTFTs) exhibiting mobility values exceeding 50 cm2/Vs and Ion/Ioff ratios >105. The project will cover all stages of OTFT fabrication as it will include exfoliation of MXenes and preparation of inks of blended materials, extensive multiscale characterization of structural, optical, electronic and transport properties of the printed thin layers of blended material, theoretical modelling of their charge transport properties and evaluation of printed devices from the electronic performance standpoint. The role of electronic and morphological parameters of the dielectric surface on structural and charge-transport properties of thin films fabricated by different printing protocols will be investigated. We will devise means to fabricate OTFTs entirely by printing MXenes inks. Source and drain contacts will comprise MXenes and the channel will comprise a MXene/OS blend. Measured energetic distributions and charge carrier mobility will be compared to the results of simulations based on model Hamiltonians parameterized against Density Functional Theory calculations, thereby allowing to scale up and increase the complexity of the modelled transport layers.

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