

The 16th Femtochemistry Conference (FEMTO16)



Contribution ID: 23

Type: **Invited talk**

Ultrafast dynamics of colloidal plexcitonic nanohybrids studied by 2D electronic spectroscopy

Thursday, June 26, 2025 2:10 PM (30 minutes)

The burgeoning field of polaritonic chemistry explores the interaction between molecules and confined electromagnetic field modes, enabling new chemical reactivities. Colloidal plexcitonic materials are particularly promising due to their easy and cost-effective preparation. Plexcitons are hybrid states resulting from the combination of plasmon resonances of metal nanostructures with molecular excitons. They enable the confinement of electromagnetic fields at the nanoscale and the establishment of strong couplings between light and matter, potentially leading to controllable and adjustable dynamic phenomena. However, the ultrafast coherent and incoherent dynamics of colloidal plexciton nanohybrids are not well understood. In this study, 2D electronic spectroscopy was used to investigate the ultrafast dynamics of these systems, focusing on identifying possible quantum coherent interactions after photoexcitation. By comparing the response of different nanohybrids and uncoupled components, the most relevant nonlinear photophysical processes underlying the femtosecond coherent and incoherent dynamics were identified, advancing our understanding and potential applications of these nanomaterials. Particularly noteworthy is the detection of clear signatures of 'vibronic plexcitons' dynamics, representing the first experimental observation of such excitations in colloidal systems, to the best of our knowledge.

Author: COLLINI, elisabetta (Università di Padova)

Co-author: Mr TOFFOLETTI, federico (Università di Padova)

Presenter: COLLINI, elisabetta (Università di Padova)

Session Classification: Session 13 - Materials I