

Mechanofluorochromic molecular materials as potential local stress probes

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Fluorescent materials are able to signal different stimuli with a high sensitivity. In particular, a material is called “mechanofluorochromic” when its fluorescence emission changes upon mechanical stimulation (pressure, shearing force...). Mechanofluorochromic compounds have attracted a rapidly growing interest for the last ten years and several series of new molecules have been synthesized. ^[1] We are interested in a multiscale study of this phenomenon, in order to relate the molecular structure of a mechanofluorochromic dye to its sensitivity to different mechanical stimuli, and we aim at quantifying the fluorescence response to a mechanical stimulus, with the ultimate goal of developing force sensors based on these fluorescent probes.

We have studied various series of mechanofluorochromic compounds ^[2], amongst which difluoroboron β -diketonate derivatives, that gather appealing photophysical properties (bright luminescence in the solid state together with a marked change in fluorescence emission colour after mechanical stimulation) and versatile synthesis ^[3]. The photophysical properties of those novel compounds in thin films and in nanoparticles will be presented, as well as our strategies to quantify their mechanofluorochromic responses, at the macroscale and at the nanoscale. ^[4]

References:

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