

Quantifying the mechanofluorochromic response of a triphenylamine to compression at the macroscale

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A compound is said to be mechanofluorochromic when its fluorescence properties are modified under an external mechanical force [1]. The opportunity to follow fluorescence modifications by non-invasive spectroscopic measurements makes them good candidates for mechanical stress probes [2]. Triphenylamine derivatives are well known for their mechanofluorochromism as molecular materials. However, to the best of our knowledge, the type and intensity of force that have to be applied to these compounds to observe a fluorescence response remain unknown.

We designed a setup which is able to apply an anisotropic mechanical stimulus on a molecular material under illumination and to simultaneously record fluorescence pictures as well as force values (figure 1a). The colorimetric analysis to quantify the pressure threshold required to observe mechanofluorochromism will be described (figure 1b), together with the outstanding photophysical and mechanofluorochromic properties of a simple triphenylamine derivative, TPA-bistBu-CHO (figure 1c).

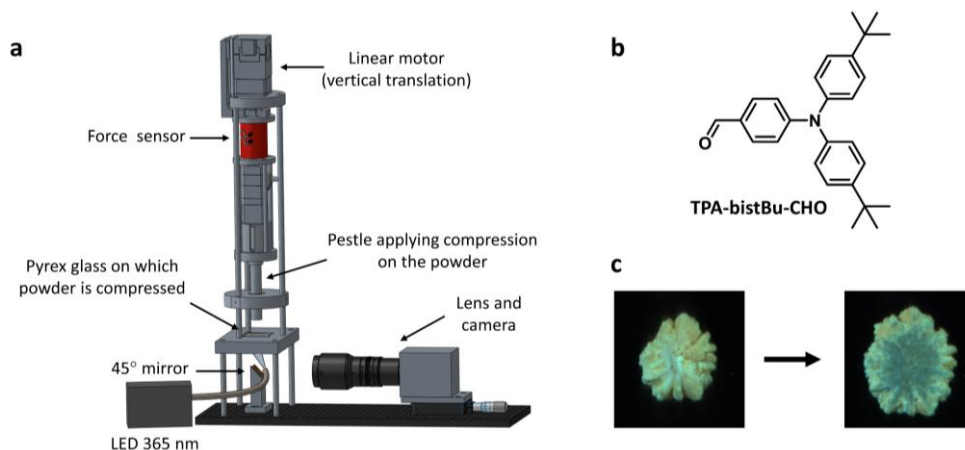


Figure 1. (a) scheme of the setup used to quantify mechanofluorochromic response, (b) TPA-bistBu-CHO structure and (c) pictures of a TPA-bistBu-CHO crystal before (left) and after (right) a compression applied via this setup.

[1] Y. Sagara; S. Yamane; M. Mitani; C. Weder; and T. Kato, *Adv. Mater.* **2016**, *28*, 1073-1095.

[2] D. R.T. Robert; S. J. Holder; *J. Mater. Chem.* **2011**, *21*, 8256-8268