Storing Data on Individual Self-Assembled Ribbons via Mechano- and Photochromism

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A Pt(II) complex, bearing an oligo-ethyleneoxide pendant, is able to selfassemble in ultralong ribbons that display mechanochromism upon nanoscale mechanical stimuli, delivered through atomic force microscopy (AFM). Such observation paves the way to fine understanding and manipulation of the mechanochromic properties of such material at the nanoscale. AFM allows quantitative assessment of nanoscale mechanochromism as arising from static pressure (piezochromism) and from shear-based mechanical stimuli (tribochromism, Fig. 1), and to compare them with bulk pressure-dependent luminescence observed with diamond-anvil cell (DAC) technique. Confocal spectral imaging reveals that mechanochromism only takes place within short distance from the localized mechanical stimulation, which allows to design high-density information writing with AFM nanolithography applied on individual self-assembled ribbons. Each ribbon hence serves as an individual microsystem for data storage. The orange luminescence of written information displays high contrast compared to cyan native luminescence; moreover, it can be selectively excited with visible light. In addition, ribbons show photochromism, i.e., the emission spectrum changes upon exposure to light, in a similar way as upon mechanical stress. Photochromism is conveniently used to conceal and eventually erase information previously written with nanolithography by irradiation.

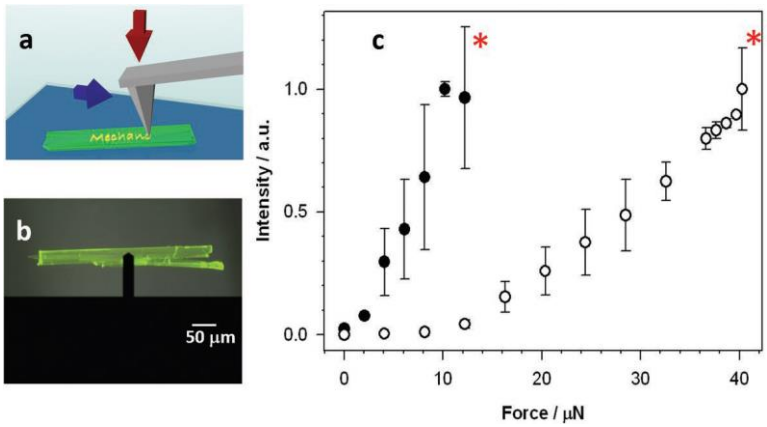

Figure 1. a) Sketch of nanomechanical stresses applied with AFM: (i) static pressure (ii) shearing forces due to friction. b) Image of AFM cantilever approaching a ribbon. c) Plots of MS luminescence intensity during application of static force (piezochromism, white circles) or after writing squares at scan rate 10 µm s−1 (tribochromism, black circles).

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References:

[1] D. Genovese, A. Aliprandi, E. A. Prasetyanto, M. Mauro, M. Hirtz, H. Fuchs, Y. Fujita, H. Uji-I, S. Lebedkin, M. Kappes and L. De Cola, *Adv. Funct. Mater.*, **2016**, 26, 5271