

MULTI-STIMULI-RESPONSIVE FOLDAMERS

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Foldamers are synthetic helical oligomers that adopt stable secondary conformations in solution reminiscent of the folding behaviour of some natural systems.¹ These artificial systems are of great interest to chemists due to their wide-ranging applications in a diverse array of fields including supramolecular chemistry, crystal engineering, synthesis and materials chemistry.² In recent years, there has been an explosion in reports of responsive foldamers that can demonstrate stimuli-controlled changes to their scaffold,³ but literature examples of multi-stimuli-responsive foldamers remain rare.⁴

Herein, we report on dual, light-responsive and redox-active foldamers that demonstrate reversible and robust stimuli-induced behaviour (Fig. 1a).⁵ UV/Vis, ¹H NMR and circular dichroism (CD) spectroscopy and cyclic voltammetry have been used to establish the reversibility and robust nature of the light- and redox-driven behaviour of these new foldamers (Fig. 1b). Minimal levels of fatigue are observed for these systems even upon multiple cyclic treatments with irradiative/non-irradiative and oxidative/reductive conditions. This work paves the way towards the creation of stimuli-responsive foldamers of increasing sophistication capable of demonstrating reversible and robust responses to multiple distinct stimuli.

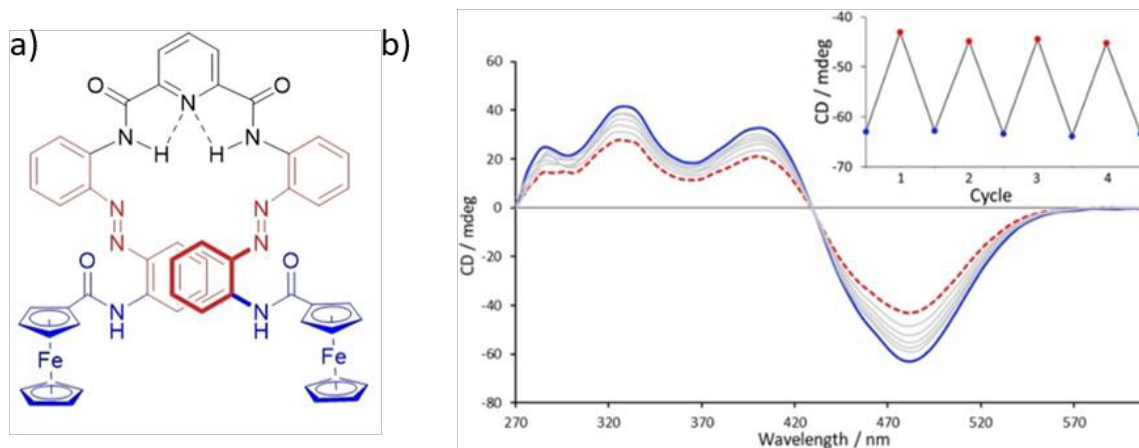


Figure 1. a) Dual, achiral light-responsive and redox-active foldamer; b) CD spectra of a related chiral dual-responsive foldamer before irradiation (blue line) and at the photo-stationary state (PSS) (dashed red line) after irradiation of a 6.1×10^{-5} M dichloromethane sample with 365 nm for 10 min. Grey lines show the thermal relaxation of a chiral dual-responsive observed over 80 min. Inset shows light- and thermally-driven cycles of E/Z-isomerisation of the azo bonds of a chiral dual-responsive foldamer.

References

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