« COLORED » MULTI-STIMULI RESPONSIVE HYDROGELS

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Controlled deformation processes are ubiquitous both in biological systems and materials science. For example, muscles may undergo expansion or contraction as a result of an external physiological stimuli. Similarly, synthetic smart polymer gels, capable of swelling or deswelling in response to various physical and/or chemical stimuli, have been developed during the last decades. Complexes fabricated from the electron deficient cyclobis(paraquat-*p*-phenylene) ($CBPQT^{4+}$) and electron-rich guests have become one of the most important building blocks for the synthesis of colored self-assembled architectures.[1] Here, we report on the successful engineering of new multi-stimuli responsive macromolecular hydrogels featuring $CBPQT^{4+}$ based complexes. More particularly, we have exploited these colored $CBPQT^{4+}$ based interactions to i) control the swelling/shrinking processes of materials by applying different stimuli (T, V, competitive macromolecules)[2] i) to impart both thermal and temporary memory function to hydrogels[3] and iii) to develop polymeric hydrogel systems capable of swelling *via* a supramolecular transmission. An important practical aspect of these new functional materials is that all relevant phenomena (swelling/shrinking processes, memory function) have an associated visible readout.

References

1) Odell, B.; Reddington, M. V.; Slawin, A. M. Z.; Spencer, N.; Stoddart, J. F.; Williams, D. J., A*ngew. Chem. Int.* **1988**, 27, 1547.
2) Sambe, L.; de La Rosa, V. R.; Belal, K.; Stoffelbach, F.; Lyskawa, J.; Delattre, F.; Bria, M.; Cooke, G.; Hoogenboom, R.; Woisel, P., *Angew. Chem. Int.* **2014**, 53, 5044 (cover picture)
3) K. Belal, F. Stoffelbach, J. Lyskawa, M. Fumagalli, D. Hourdet, A. Marcellan, L. D. Smet, L. De Smet, V. R. De la rosa, G. Cooke, R. Hoogenboom, P. Woisel, *Angew. Chem. Int.* **2016**, 55, 13974.

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