

FUNCTIONAL POLYMERIC SENSORS

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In the last decades, responsive polymeric materials are gaining significant interest for the development of smart materials.¹ Within this context, thermoresponsive polymers that undergo a solution phase transition in aqueous solution are especially interesting. Polymers that phase-separate upon heating, so-called lower critical solution temperature (LCST) behaviour, are widespread based on entropy-driven dehydration of polymers with intermediate hydrophilicity, such as poly(N-isopropylacrylamide),² poly(oligoethyleneglycol (meth)acrylate)s³ and poly(2-oxazoline)s.^{3,4}

Recent progress from our group in the area of responsive polymer sensors will be addressed in this contribution. A first topic that will be discussed are multi-responsive solution polymer sensors, that simultaneously respond to temperature and pH⁵ or temperature and salt.⁶ These latter systems are based on polymer coated gold nanoparticles and also act as logic gates.⁷ Secondly, solid state sensors for gases will be discussed based on electrospun fibrous mats functionalized with halochromic dyes.⁸ These systems show a near instantaneous change of color when exposed to acid or base vapors as well as to biogenic amines.

[1] Cohen Stuart, M. A.; et al. *Nat. Mater.* 2010, 9, 101.

[2] Schild, H. G. *Prog. Polym. Sci.* 1992, 17, 163.

[3] Vancoillie, G.; Frank, D.; Hoogenboom, R. *Prog. Polym. Sci.* 2014, 39, 1074.

[4] Weber, C.; Hoogenboom, R.; Schubert, U. S. *Prog. Polym. Sci.* 2012, 37, 686.

[5] Pietsch, C.; Hoogenboom, R.; Schubert, U. S. *Angew. Chem. Int. Ed.* **2009**, 48, 5653.

[6] Zhang, Z.; Hoogenboom, R.; De Geest, B. G.; et al. *Chem. Mater.* **2013**, 25, 4297.

[7] De la Rosa, V. R.; Zhang, Z.; De Geest, B. G.; Hoogenboom, R. *Adv. Funct. Mater.* **2015**, 25, 2511.

[8] Geltmeyer, J.; Vancoillie, G.; Steyaert, I.; Breyne, B.; Cousins, G.; Lava, K.; Hoogenboom, R.; De Buysser, K.; De Clerck, K. *Adv. Funct. Mater.* 2016, 26, 5987-5996.