

of swellable molecularly imprinted polymer particles by surface plasmon resonance spectroscopy.

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Abstract:

Surface plasmon resonance (SPR) has been used to investigate template binding at sites in theophylline-imprinted poly-[N-(N-propyl) acrylamide] particles. At concentrations as low as 10^{-6} M theophylline, particle swelling is detected as a shift in the angle of minimum reflectance. The binding constant of theophylline estimated from the inflection point of the theophylline calibration curve is approximately 10,000. The imprinted polymer particles do not respond to caffeine or theobromine (which differs from theophylline by a single methyl group) at concentrations as high as 10^{-2} M. Full-scale response of the imprinted polymer particles to theophylline (template) occurs in less than 15 minutes, and swelling is reversible. The immobilized imprinted polymer particles can undergo approximately 20 to 25 swelling and shrinking cycles before there is significant loss in functionality. A unique aspect of these imprinted polymer particles is that template binding causes the angle of minimum reflectance to decrease, not increase, in magnitude. Adsorption, which causes an increase in the angle of minimum reflectance, can be readily discriminated from template binding.