

## ON THE USE OF ADSORBED, RESPONSIVE POLYMER-LAPONITE PARTICLES TO REVERSIBLY CAPTURE DISPERSED PARTICLES

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The objective of this 12-month EPSRC project, which began in March 2004, was to test the proposal that responsive polymer chains adsorbed to an interface have potential to sort proteins. If proven, this approach would have application in microarray technology. The strategy adopted involves the preparation of temperature-responsive polymer-Laponite particles confined to an electrode surface followed by study of reversible capture of dispersed polystyrene particles (model proteins). Laponite is a synthetic clay which consists of discs with a diameter of 20 nm and a thickness of 1 nm. The adsorbed, responsive particles would act as “macromolecular hands”, reversibly trapping and releasing dispersed particles. In this work the temperature-responsive polymer is poly(NIPAM-co-PEGMA) (N-isopropylacrylamide and poly(ethyleneglycol) methacrylate). This polymer has been previously shown to confer reversible, temperature-induced gelation to emulsions and latexes<sup>1,2</sup>. In this work poly(NIPAM-co-PEGMA) was grafted to the laponite particle face using atom transfer radical polymerisation (ATRP). As of month nine of the project, the work performed has involved synthesis of the ATRP initiator, adsorption of the ATRP initiator to dispersed Laponite and surface-confined ATRP of NIPAM and PEGMA using the functionalised Laponite particles. Reversible gelation of the dispersed Laponite-polymer particles has been demonstrated. A method for quantifying the concentration of dilute Laponite dispersions was required for the adsorption stage of the work and has now been developed. Study of the Laponite using electrokinetic sonic amplitude measurements was performed to investigate the pH-dependent charge of the particles. The final stage of the project involves adsorption of laponite onto an electrode, in-situ surface-confined ATRP of NIPAM and PEGMA on the adsorbed Laponite particles followed by reversible capture of dispersed polystyrene particles. These results will be discussed.

1. A. Koh and B. R. Saunders, *Chem. Commun.* 24, 2461-2462, **2000**.
2. C. Alava and B. R. Saunders, *Langmuir*, 20, 3107, **2004**.