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Polymeric Microgels as Potential Drug Delivery Vesicles RYAN MCDONOUGH, KIRIL STRELETZKY, MEKKI BAYACHOU, PUBUDU PEIRIS, Cleveland State University — The temperature dependent volume phase change of cross-linked amphiphilic molecules (microgels) suggests their use as drug delivery vesicles. Drug particles aggregate in the slightly hydrophobic microgel interior. They are stored in equilibrium until the critical temperature (Tv) is reached where the volume phase change limits available space, thus expelling the drugs. This loading property of hydroxypropylcellulose (HPC) microgels was tested using amperometric analytical techniques. Small molecules inside microgels do not approach the electrode surface, which decreases current signal. A room temperature (Troom) flow amperometric measurement comparing microgel/paracetamol solution with control paracetamol samples yielded about 20 percent concentration reduction in the microgel sample. Results from the steady-state electrochemical experiment confirm the 20 percent concentration drop in the microgel sample compared to the control sample at Troom. Using the steady-state experiment with a cyclic temperature ramp from Troom to beyond Tv showed that the paracetamol concentration change between the temperature extremes was greater for the microgels than for the controls. An evolving aspect of the study is the characterization of microgel shrinkage from in situ, temperature controlled liquid AFM images as compared to previously completed DLS characterization of the same microgel sample.

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