Abstract

Hyperbranched poly(ethylenimine)s (HPEI) were modified with hydrophobic isobutyryl amide groups (HPEI-IBAm0.60) to cause an LCST. These modified polymers were then further substituted with hydrophobic alkyl chains (HPEI-IBAm0.60-R0.40), a mixture of alkyl chains and hydroxyethyl groups (HPEI-IBAm0.60-EtOH0.20-R0.20), and a mixture of alkyl chains and low molecular weight PEG (HPEI-IBAm0.60-PEG0.20-R0.20) to determine the effect of different functional groups on solubility behavior. At pH 7.4, all but three LCSTs were below body temperature (37 °C), while at pH 5, all but three LCSTs were above body temperature. The effect of the concentration of amines per gram of polymer (APG) on the solubility behavior was also investigated. The expected decrease in cytotoxicity from modifying primary amines to secondary amines, as well as the sensitivity to temperature and pH stimuli, makes these polymer systems strong candidates for non-viral gene delivery vectors.