Abstract

Mussel adhesive proteins (MAPs) are remarkable underwater adhesive materials which form tenacious bonds between certain marine organisms and the substrates upon which they reside. MAPs have a high content of L-3,4-dihydroxyphenylalanine (L-DOPA), an amino acid which is believed to be responsible for the adhesion, crosslinking, and metal ion complexation properties of MAPs. Our interest is in developing DOPA-containing synthetic polymers for use as biomaterials, and in this paper we describe our preliminary efforts toward the synthesis and characterization of linear and branched DOPA-poly(ethylene glycol) conjugates (DOPA-PEGs). Several linear and branched DOPA-PEG conjugates were synthesized and found to form complexes with Fe$^{3+}$ as determined by spectrophotometric analysis. Similar complexes between Fe$^{3+}$ and DOPA-PEG were rapidly formed by thermally triggered release of Fe$^{3+}$ from liposomes. Ongoing experiments are aimed at elaborating the nature of the complexes and whether intermolecular complexes between PEG-bound DOPA endgroups can result in physical gelation.