



Removal of heavy metals from solution using biocompatible polymers

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ABSTRACT

Well characterised, hydrophobic, poly(vinylidene fluoride) and poly(sulfone) membranes, a physisorbed amphiphilic surfactant as an affinity linker with covalently attached bio-specific ligands to demonstrate heavy metal ion binding and re-use is reported. Central to this technology are the easy to manufacture membranes and a biocompatible PluronicTM surfactant that serves multiple functions, where it acts not only as an affinity linker, preventing non-specific protein adsorption to the membrane surface but also non-covalently hydrophilises the membrane matrix. This work describes the fabrication and characterisation of non-porous, hydrophobic membranes for the attachment of a robust, bio-compatible ligand, in order to specifically chelate divalent cations (Cd²⁺, Ni²⁺, Zn²⁺, Cu²⁺) and subsequently, histidine tagged proteins. These affinity tags are frequently used by bioengineers and biochemists to produce recombinant enzymes, peptides, hormones and antibodies. Successful coupling of ligands to Pluronic was achieved followed by quantification of the ligand binding sites on the surface. This technology is scalable (due to the multi-variant membrane module design), able to resist non-specific protein adsorption and can be regenerated and re-used (up to five times) with a simple anionic surfactant solution.

Keywords: Heavy metals; Affinity membranes; Chelating ligand; Pluronic; Regeneration

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