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# Oligomeric Precursors to Amphiphilic Networks for use in Tissue Engineering

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Amphiphilic networks are composed of both hydrophobic and hydrophilic monomers in either random repeat units or block copolymer sequences<sup>[1]</sup>. These materials show great promise as substrates for tissue engineering scaffolds. The controlled reaction conditions in the synthesis of these oligomeric precursors can lead to phase separation. The success of cell culture can be accredited to this porosity within the amphiphilic materials, due to an increased infiltration of cells and nutrients through the pores.

The synthesis of these oligomeric precursors can be carried out in a non-trivial way. Radical chain polymerizations can be carried out by modern routes such as ATRP and RAFT. The reagents used in these methods however often involve toxic catalysts, without being able to remove these entirely the issue of toxicity remains.

The use of ozonolysis of alkene containing polymers to give reactive oligomers circumvents any toxicity issues. Monomer starve-fed emulsion polymerization has been utilized in the synthesis of a non-cytotoxic material for the oligomeric precursor in this research. Results presented include various copolymers consisting of butadiene and butyl methacrylates that were synthesised in emulsion with varying quantities of cyclodextrin. The inclusion of cyclodextrin was used to facilitate the incorporation of butadiene in the copolymer. Subsequent ozonolysis; also in aqueous emulsion of these latexes and work up produced oligomers with carboxylic acid end groups. This route avoids toxic reagents associated with other methods and is suitable for large scale polymerizations.

[1] S. Rimmer, M. J. German, J. Maughan, Y. Sun, N. Fullwood, J. Ebdon and S. MacNeil, *Biomaterials* **2005**, 26, 2219-2230