(OP 266) Stimuli-Responsive Biomineralization onto Biodegradable Substrates

N. M. Alves[1,2], J. Shi[1,2], C. I. Dias[1,2], J. F. Mano[1,2]

[1]3B's Research Group–Biomaterials, Biodegradables and Biomimetics, University of Minho, Polymer Engineering Department, Campus de Gualtar, Braga, Portugal
[2]IBB - Institute for Biotechnology and Bioengineering, Portuguese Government Associated Laboratory, Braga, Portugal

Bioactive composites that enable the formation of an apatite layer onto the surface are important in field of tissue engineering and regenerative medicine, namely in the development of osteo-

conductive biomaterials for orthopaedic applications. The aim of this work was to control the biomineralization event by triggering external stimuli, namely, temperature and pH. Poly (L-lactic acid) (PLLA) reinforced with Bioglass®, was modified by grafting either poly(N-isopropylacrylamide) (PNIPAAm) or chitosan to the surface, by using plasma activation methodologies.

Regarding the PNIPAAM-grafted surfaces, it was found that temperature could trigger the formation of apatite upon immersion in SBF above the LCST of PNIPAAm, but no apatite could be formed at 25°C.

For the chitosan-grafted substrates the apatite formation upon immersion in SBF was analysed. It was found that the formation of apatite could be blocked when the pH was 5.4. On the other hand, a dense apatite layer was formed at pH 7.4.

These results suggest that the formation of apatite or possibly other kinds of minerals could be controlled by such "smart," in these case pH- and thermo-responsive, surfaces. For the smart surfaces analysed in this work, the apatite formation was always blocked when the grafted chains adopted an extended conformational state.