# ROLE OF SURFACE PHYSICO-CHEMICAL PROPERTIES IN POLYMER BIOCOMPATIBILITY

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There is an increasing interest in the use of polymeric materials as a support for cell culturing to be applied in several interesting fields. The most studied application of polymers in this field is their use as biomaterials for medical implants and as scaffolds for tissue regeneration as it is the case of bone [1] or cartilage tissues [2]. However, other potential applications are becoming increasingly important. This is the case of the biosensor field, in which recent approaches highlight the use of cell-based biosensors that use living cells as recognition elements for toxic agents [3, 4]. In this case, the active part of the biosensor has to be compatible with cell growing and the materials used (mainly polymers or glass) should be suitable for technological processing.

The aim of this work is to study the physico-chemical properties contributing to the biocompatibility of different polymers that are or could be used in biosensor or lab-on-chip applications [5]. For this purpose, four polymeric materials widely used in research and industry have been characterized: poly(methyl methacrylate) (PMMA), polystyrene (PS), poly(ethylene-2,6-naphthalate) (PEN) and poly(dimethylsiloxane). Glass was used as a control material.

Polymer wettability properties were characterized by measuring their surface tension. These measurements were done before and after a sterilization process with ethanol and UV-light. Surface tension values were quantified from contact angle measurements of three different liquids on the substrates and applying van Oss's acid-base theory [6]. The polymer ability to adsorb proteins from the cell culture media was evaluated by detergent protein desorption and colorimetric assay. Finally, polymer biocompatibility was characterised by measuring the proliferation of osteoblast-like cells on the studied substrates.

Results show that sterilization procedures introduce significant changes in the polymer surface tension, thus changing polymer hydrophobicity. Measurements on protein adsorption show correlations between the amount of protein on the surface and the polymer surface tension. For the biocompatibility tests, PMMA resulted in the best performance for the cell type assayed. This result seems to be related to the relative value between surface tensions of the polymer surface and the cell culture medium, as well as to the contribution of the different components of the surface tension value.

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