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TITLE

Relationship between cell behavior and micro-structure of silicone rubber/organoclay nanobiocomposites

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Attempts have been made to prepare nanocomposites based on medical grade HTV silicone rubber and organoclay with varying amount of clay compositions. Incorporation of the nanosilicate platelets onto the silicone rubber matrix was carried out via melt mixing process by using a Brabender internal mixer. Tensile elastic modulus of the nanocomposites was measured by performing tensile test on the samples. Nanocomposites with different flexibility and crosslink density were studied as substrate for the investigation of cell behavior including attachment, biocompatibility and morphology of endothelial cells, and differentiation potential and extracellular matrix remodeling of human adipose-derived stem cells. The results showed that viability, proliferation and spreading of cells are governed by the microstructure and elastic modulus and stiffness of samples. Furthermore, hASCs cultured on PDMS and corresponding nanocomposites could retain differentiation potential into osteocyte with or without soluble factors, indicating that not only inclusion of organoclay would not prevent osteogenic differentiation, but also cause better differentiation of hASCs. Moreover, better endothelial cell spreading and proliferation associated with ECM remodeling in hASCs was observed for the nanocomposite samples.

Keyword: Nanocomposite, Micro-structure, Biocompatibility, Differentiation, ECM remodeling.

Biography

I received MSc and Ph.D degree in polymer engineering at Birmingham University of England. Academic activity was started in 1981 at polymer engineering department of Amirkabir University in Tehran. My main research activities have been focused on microstructure- properties correlation of polymer nanocomposites and nanobiomaterials. I am currently full professor at this department and published over 90 international papers.