

8th Euro Biotechnology Congress

August 18-20, 2015 Frankfurt, Germany

Preparation and characterization of alginate beads reinforced with silica nanoparticles for microbial cell culture

Nasirzadeh Keyvan¹, A Arpanaei and P Shariati

¹Imam Hossein Comprehensive University, Iran

²National Institute of Genetic Engineering and Biotechnology, Iran

Silica-alginate nanocomposites were prepared by reinforcing the alginate beads with silica nanoparticles and used for microbial cell culture. Nonporous silica nanoparticles (NSNs) and mesoporous silica nanoparticles (MSNs) were prepared and then amine-functionalized with N-(2-aminoethyl)-3-aminopropyl trimethoxy-silane (EDS) to prepare positively charged amine-nanoparticles. Different concentration of the prepared unfunctionalized and amine-functionalized silica nanoparticles were utilized to prepare reinforced alginate beads. Mechanical stability of the prepared beads was investigated and the Young's modulus values were calculated. DH5 α cell were entrapped in the prepared beads and then their growth was studied. In addition, the toxicity of the silica particles on the growth of the cells was also studied. Young's modulus values of the beads reinforced with all the silica nanoparticles were markedly improved in comparison to that of the beads without any silica nanoparticles. The Young's modulus values of the beads reinforced with amine-functionalized MSNs was measured to be approximately 4.5 folds higher than that for the bare alginate beads. The existence of silica nanoparticles in the alginate beads not only increases their mechanical stability but also decreases the leakage of cells from the beads. In addition, the results showed that the various silica nanoparticles prepared in this work does not show any significant effects on viability of the encapsulated cells. Finally, the superior properties of the prepared nanocomposite beads recommend them as a suitable cell culture system for microbial cells' cultivation for various applications.

Biography

Nasirzadeh Keyvan received his Msc in Industrial and Environmental Biotechnology in the group of Dr Ayyoob Arpanaei at National Institute of Genetic Engineering and Biotechnology, Iran, in 2014. He is currently a PhD student in Nanobiotechnology at Imam Hossein Comprehensive University, Iran. His research interests encompass the development of a suitable 3D nanocomposite for animal and microbial cell culture.

arpanaei@yahoo.com

Notes: