J Material Sci Eng 2013, 2:4
http://dx.doi.org/10.4172/2169-0022.S1.012

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Materials Science & Engineering

October 07-09, 2013 Hampton Inn Tropicana, Las Vegas, NV, USA

Development of biocompatible poly(2-hydroxyethyl methacrylate-co- acrylic acid) hydrogels as keratoprosthetic biomaterials

Jui-Yang Lai
Chang Gung University, Taiwan

Progress in biomaterial science has greatly contributed to the development of keratoprosthesis. In order to eliminate the risk of endothelial rejection associated with corneal transplantation, our group has designed a functional keratoprosthetic hydrogel composed of 2-hydroxyethyl methacrylate (HEMA) and acrylic acid (AAc). Given that the characterizations of corneal cellular and tissue responses to hydrogel materials are critical to their potential ophthalmic applications, here we aimed to investigate the relationship between the feed composition of HEMA/AAc and material compatibility towards cornea. Results of electrokinetic measurements showed that an increase in absolute zeta potential of photopolymerized membranes is observed with increasing the volume ratios of AAc/HEMA. Following 4 days of incubation with various hydrogels, the primary rabbit corneal cell cultures were examined for viability, proliferation, and pro-inflammatory gene expression. In addition, the 7-mm-diameter membrane implants made from photopolymerized materials were placed into the ocular anterior chamber for 4 days and assessed by biomicroscopic examinations, corneal thickness measurements, and quantitative real-time reverse transcription polymerase chain reaction analyses. The hydrogel samples prepared from the solution mixture containing 0-10 vol % AAc displayed good cytocompatibility and biocompatibility. However, higher anionic charge density of materials may lead to abnormal transmembrane transport of ions. It is concluded that the chemical composition of HEMA/AAc has an important influence on the corneal cellular and tissue responses to keratoprosthetic biomaterials.

Biography

Jui-Yang Lai obtained his Ph.D. in Chemical Engineering in 2006 from the National Tsing Hua University, Taiwan. Currently, he is working as an Associate Professor of Institute of Biochemical and Biomedical Engineering, Chang Gung University, Taiwan. Dr. Lai's primary research activities are centered on the development of functional biomaterials for ophthalmic use, particularly on tissue engineering and drug delivery. He has published 4 book chapters and 46 international peer review journal papers. Dr. Lai also serves as an editorial board member for 17 international journals and a peer reviewer for 38 international journals.

jylai@mail.cgu.edu.tw

SERS studies of green synthesized copper nanoparticles and their catalytic activity

B. Sreedhar[1], S. Annapurna[2], Y. Suresh[2] and G. Bhikshamaiah[2]
[1]Indian Institute of Chemical Technology, India
[2]Osmania University, India

Synthesis of metal nanoparticles is a prominent research area because of their high potential applications for the development of novel technologies. The present work reports a fast, convenient and eco-friendly method for the synthesis of copper nanoparticles. Copper nanoparticles were prepared by chemical reduction method using eco-friendly stabilizer, papaya extract (green synthesis). These nanoparticles were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), and transmission electron microscopy (TEM) experiments to study the crystalline nature, size, shape and morphology of copper nanoparticles. XRD analysis revealed that there are three main characteristic diffraction peaks present at around 2θ=43°, 50° and 74° which correspond to the (111), (200), (220) crystallographic planes of face-centered cubic crystals. The crystallite size is calculated using Scherer's formula and found to be around 25 nm. SEM and TEM images of green synthesized copper nanoparticles showed the mostly monodispersed distribution of particles with average size of 20 nm. SERS spectra were observed by micro-Raman spectrophotometer (Micro Raman Lab RAM HR 800 model). The surface enhanced Raman spectroscopy (SERS) results showed the formation of copper nanoparticles. The catalytic activity of the green synthesized copper nanoparticles has also been investigated.

Keywords: Papaya extract, green synthesis, copper nanoparticles, surface enhance Raman spectroscopy and catalytic activity.

Biography

B. Sreedhar is a senior scientist in Indian Institute of Chemical Technology, Hyderabad. He has more than 285 research papers published in various national and international journals. He did his M.Sc. Physics and Ph.D. from Sri Venkateswara University, Tirupati.

sathirajua@yahoo.com