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Study of brain targeted nanocurcumin for the prevention of cerebral ischemia

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Worldwide, stroke remains the third most common cause of death after cardiac disease and cancer. Stroke, mainly resulting from the interruption of cerebral blood circulation, is a devastating pathology characterized by the sudden development of neurological deficits due to neuronal dysfunction. Elucidation of the role of oxidative injury is important because therapy with agents that scavenge reactive oxygen species and augment endogenous antioxidant capacity may prove useful in therapeutic modulation of these devastating neurological conditions. Curcumin is having thereupeutic properties including potent antioxidant as well as anti-inflammatory activity. It is a yellow colored polyphenolic natural compound derived from rhizome of Curcuma longa. Cerebral ischemia/reperfusion injury may occur through oxidative stress or mitochondrial dysfunction and leads to apoptosis. In the present study we investigate the neuroprotective action of nanocurcumin as compare to pure curcumin in middle cerebral artery occlusion (MCAO) induced focal cerebral ischemia. We prepared curcumin loaded polymeric nanocurcumin by using NIPAAM-VP. Physiochemical characteriztion were studied using TEM, DLS, FTIR and NMR. The middle cerebral artery of adult male Wistar rats(15 days,i.p) was occluded for 2 h and reperfused for 22 h. The data indicate that the polymeric brain targeted nanocurcumin has 300,000 better protections on MCAO as compared to the pure curcumin.

Biography

M Samim is Assistant Professor of Chemistry in department of chemistry Hamdard University, New Delhi. He did his PhD in the area of Nanotechnology at Dept. of chemistry, Delhi University 2009. Currently, His area of work includes drug delivery, gene delivery, and synthesis of metal nanoparticles, Biomaterials nanotoxicology and Nanomedicine. He has got major project from University of Grant Commission, India on “size dependent toxicity of titanium dioxide nanoparticles” and Fast track project from Depatment of science and technology, India on “size dependent antifungal studies of silver nanoparticles”. He also got project from Depatment of science and technology, India on “Formulation of curcumin nanoparticles for the treatment of brain ischemia.He has published 20 articles in indexed journals out of which one has received Best paper award from Materials Research Society of India in 2008 and filed six patents on nano formulation. He has organized an Indo-Us symposium on “Cancer Nanotechnology” as an Treasurer in 2009.

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Thermally oxidized Zirconium nanocrystalline thermal barrier coating deposited by EB-PVD

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Zirconium oxide nanocrystalline deposited at difference partial pressure of oxygen on the bound coat of thermal barrier coating (TBC) by employing an electron beam physical vapour deposition (EB-PVD) was thermally oxidized at oxygen ambient within 1073 K after deposition process resulting in Zirconium oxide top layer from various stoichiometries. Intermetallic alloys based on γ -TiAl due to offer low density over conventional Ni supper alloy was used as substrate. Field emission scanning electron microscopy (FESEM) observation of the deposited specimens at three difference oxygen partial pressure during coating indicate the condense and crack free ZrO_2 by increase partial pressure up to$4x10^{-4}$. Thermally grown oxide (TGO) spontaneously had been taken place as buffer layer between top coat and bound coat which are contain 8mol% Yttria Stabilized Zirconia (YSZ) and MCrAlY (M=Ni,Co) respectively. Energy dispersive spectrometer (EDS) to determine the composition of present element after deposition was employed. X-ray diffractometer (XRD) analysis of the ex-situ TBC components revealed the phases formed at different oxygen partial pressure. The present of intermediate TGO layer was confirmed by observation of Al_2O_3 and yttrium aluminates ($YAlO_3$ and/or $Y_3Al_5O_{12}$) phases in the XRD patterns. Al_2O_3 provides an effective diffusion barrier that protects the underlying metal from deleterious oxidation during thermally oxidizing the zirconium. Using rapid thermal processing (RTP) analysis data, the effective oxidation temperature on the stoichiometry of zirconium oxide and thickness of grown were investigated therewith, the crystallization of zirconium oxide films was initiated at about 480 K and was almost completed at 525 K. Micro indentation test was accomplished to qualifying the adhesion of Zirconium oxide nanocrystalline and the interfacial of bond coat.

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