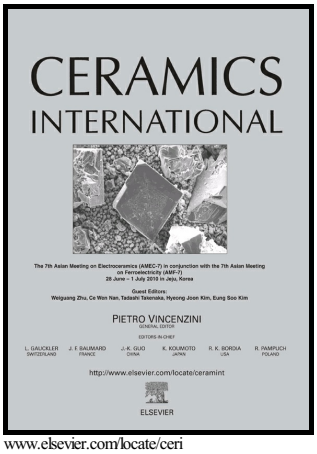

www.elsevier.com/locate/ceri

Biogenerated silica nanoparticles synthesized from sticky, red, and brown rice husk ashes by chemical method

S. Sankar, Sanjeev K. Sharma, Narinder Kaur, Byoungho Lee, Deuk Young Kim, Sejoon Lee, Hyun Jung

PII: S0272-8842(15)02279-8
DOI: http://dx.doi.org/10.1016/j.ceramint.2015.11.172
Reference: CERI11791

To appear in: *Ceramics International*

Received date: 18 September 2015
Revised date: 13 November 2015
Accepted date: 30 November 2015

Cite this article as: S. Sankar, Sanjeev K. Sharma, Narinder Kaur, Byoungho Lee, Deuk Young Kim, Sejoon Lee and Hyun Jung, Biogenerated silica nanoparticles synthesized from sticky, red, and brown rice husk ashes by chemical method, *Ceramics International*, http://dx.doi.org/10.1016/j.ceramint.2015.11.172

Biogenerated silica nanoparticles synthesized from sticky, red, and brown rice husk ashes by chemical method

S. Sankar[1], Sanjeev K. Sharma[1*], Narinder Kaur[1], Byoungho Lee[1], Deuk Young Kim[1*], Sejoon Lee[1], Hyun Jung[2]

[1]Semiconductor Materials and Device Laboratory, Department of Semiconductor Science, Dongguk University-Seoul, Seoul 100715, Republic of Korea

[2]Advanced Functional Nanohybrid Materials Laboratory, Department of Chemistry, Dongguk University-Seoul, Seoul 100715, Republic of Korea

*Corresponding Author: sksharma@dongguk.edu , dykim@dongguk.edu Tel.: +82-2-2260-3183

An inexpensive chemical method was used to synthesize biogenic mesoporous silica (m-SiO_2) from rice husk ash (RHA). A comparative study was carried out to produce silica nanoparticles (S-SiO_2, R-SiO_2, and B-SiO_2) from three type of rice husk ashes (sticky, red, and brown). The microstructure of m-SiO_2 was dependent on the geographical provenance and the types of RHA. An analysis of the SEM and TEM micrographs reveals that the S-SiO_2 nanoparticles had a clustered spherical shape, while R-SiO_2 and B-SiO_2 nanoparticles were found to be purely spherical. The average crystallite size of S-SiO_2, R-SiO_2 and B-SiO_2 nanoparticles evaluated from the TEM measurements were observed to be 50, 20 and 10 nm, respectively. The XRD pattern of silica nanopowders had an absence of sharp peaks that confirmed the amorphous nature of the material. The Fourier transform infrared (FTIR) spectra of silica nanoparticles showed the symmetric Si-O and O–Si–O stretching bond vibrations at 462, 1088, and 1098 cm^{-1}. The surface area of S-SiO_2, R-SiO_2 and B-SiO_2 nanopowders were measured to be 7.5513, 201.45, and 247.18 m^2g^{-1}, respectively. The surface area of uniformly-distributed spherical nanoparticles of B-SiO_2 were observed the highest, which can be applied for the application of energy storage and drug delivery systems.