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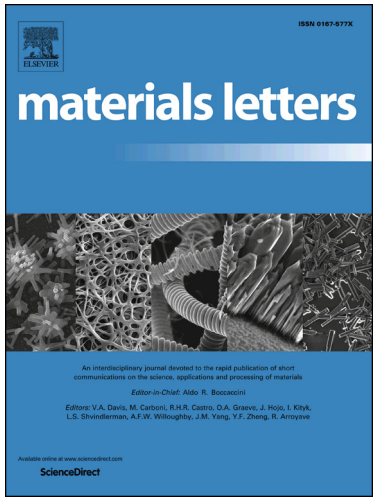

Low temperature synthesis of iron pyrite (FeS_2) nanospheres as a strong solar absorber material

Md. Wasi Ahmad, Umme Farva, M. Alam Khan

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Low temperature synthesis of iron pyrite (FeS_2) nanospheres as a strong solar absorber material

Md. Wasi Ahmad,[a*] Umme Farva[b], M. Alam Khan[c*]

[a]Department of Chemical Engineering, College of Engineering, Dhofar University, P. O. Box 2509, Salalah 211, Oman

[b]Department of Applied Science, Bansal Institute of Engineering and Technology, Lucknow, UP, 226201, India

[c]Department of Energy and Materials Engineering, Dongguk University-Seoul, Seoul 100-715, Republic of Korea

Abstract: Phase pure iron pyrite (FeS_2) nanosphere morphology was synthesized by a solvothermal route an alternative to colloidal synthesis by utilizing an ethylene glycol and benzylamine as a solvent and structure directing ligand at 160°C for 12h in Teflon lined autoclave. The as obtained nanaopheres were in average ~50 nm diameter with a smooth surface and well mono-disperse as observed by the FESEM images. The XRD analysis shows a typical iron pyrite crystal phase with 2Ɵ position at 28.23°, 32.76°, 36.84°, 40.48°, 47.32° and 56.01° without any impurity peaks. The Raman spectra further confirmed the phase pure pyrite structure. The UV-Vis and PL spectra shows excellent solar absorbance with a band gaps of 1.35 eV close to the direct band gap (1.38 eV) of pyrite materials, however the photoluminescence spectra shows a band gap of 1.39 eV close to the direct band gap. The obtained nanosphere morphology was highly promising as an excellent solar absorber material for the photovoltaic application.

Keywords: Colloidal processing, Optical materials and properties, Raman, Fool's gold, Photovoltaics, Photoluminescence

[*]To whom correspondence should be addressed: Ph.: + 968-23237344; Fax: +968-23237700
E-mail: mdwasiahmad@gmail.com (M. W. Ahmad) alamkhan77@gmail.com *(M.A. Khan).*

1. Introduction