J Nanomater Mol Nanotechnol 2017, 6:4 (Suppl)
DOI: 10.4172/2324-8777-C1-009

Where inorganic meets organic in the glassy state: Hybrid glasses and dental cements

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While glasses are conventionally formed by quenching from the molten state, amorphization from the crystalline state, notably from zeolitic precursors offers an interesting alternative. Synchrotron radiation, neutron scattering and atomistic simulation have been instrumental in analyzing these novel processes. The role of THz vibrations in zeolitic collapse appears to play a significant role. Most recently the amorphization route has resulted in the development of glasses derived from metal organic framework materials, notably from zeolitic imidazolate frameworks. Organic-inorganic geometries also occur at glass-polymer interfaces in composites, such as glass ionomer cements, where aluminium at the surface of glass particles chelate with carboxyl groups from the surrounding polyacrylic acid. In each case, hybrid bridges dictate mechanical properties, which for cements, unexpectedly fluctuate with setting.

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Green synthesis of silver nanoparticles using Ocimum sanctum (tulsi) leaf extract and evaluation of their antimicrobial activities

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There is an increasing demand of silver nanoparticles due to their unique properties and applications in various fields such as medicine, catalysis, nano electronics, textile field, pollution and water treatment. Nano-silver strong antimicrobial activity is the major reason for the development of nano-silver containing products. The silver nanoparticles are synthesis by various chemical and physical methods. The major drawbacks of chemical and physical methods are that the synthesis processes are expensive and many toxic chemicals are used. To overcome these problems green nanotechnology comes to play very crucial role for synthesis of silver nanoparticles. Use of various plants for synthesis of biogenic silver nanoparticles referred as green nanotechnology. In the present study, we reported the green synthesis of silver nanoparticles by using *Ocimum sanctum* (tulsi) leaf extract in the exposure of direct sunlight without using any chemical additive. The *Ocimum sanctum* (tulsi) leaf extract act as reducing agent as well as capping agent. Developed Ag nanoparticles were duly characterized and tested for their antibacterial activity. The formation of silver nanoparticles was observed by the change of color from colorless to brown by the addition of Ocimum sanctum (Tulsi). UV-Vis absorption spectroscopy was used to monitor the quantitative formation of silver nanoparticles. The mean particle diameter of silver nanoparticles was calculated from the XRD pattern, according to the line width of the plane and the refraction peak, using Scherrer's equation. FTIR spectroscopy confirmed the presence of chemical bonding as the stabilizing agent surrounding the Ag NPs. Antimicrobial activity of the silver bio-nanoparticles was performed by a well diffusion method. Scanning electron microscopy (SEM) & EDX analysis, the EDX spectrum of the solution containing silver nanoparticles, confirmed the presence of an elemental silver signal without any peaks of impurities.

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