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Chair	Osman Burak Okan



Formation of Copper Nanoparticles in Oxide Glasses

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Biography

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Abstract

This contribution focuses on the preparation of Cu nanoparticles in microscopic glass and lead phosphate glass.

Cu nanoparticles were prepared in microscope glass by ion exchange in 54 mol. % eutectic melt of CuSO₄ and 46 mol. % Na₂SO₄ at 590 °C. After ion exchange ($2 \text{Na}^+ \leftrightarrow \text{Cu}_2^+$), the individual glasses contained Cu₂⁺ ions, which were subsequently reduced to Cu₀ nanoparticles by H₂ followed by annealing. Characterization was performed using XRD (characteristic diffraction of Cu₀), UV-Vis spectra (surface plasmon band at $\lambda = 570$ nm), XRF (Cu content) and SEM/EDX (thickness of Cu layer thickness). Alternatively, the possibility of preparing copper nanoparticles in lead phosphate glasses by UV-induced disproportionation of monovalent copper ions to form atomic and divalent copper was investigated. Specifically, glasses of the system 55PbO - 10ZnO - 35P₂O₅ with 0.25 mol. % CuO and SnO doped were synthesized. The effect of synthesis time on the resulting physical properties, including the presence of monovalent copper ions, was studied for the prepared glasses. Samples of these glasses were subsequently exposed to UV light to prepare copper nanoparticles. The presence of monovalent copper ions and the subsequent formation of copper nanoparticles were confirmed for the glasses with short synthesis times by UV-Vis spectroscopy and luminescent behavior.

Acknowledgments

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