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Formation of nanostructures in Silicon Oxynitrides by Ion Implantation

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The photoluminescence signal of Amorphous silicon oxynitrides can be tunable by controlling their stoichiometry. The change in PL is related to defect centres and phase structures changes [1]. A coupling between the surface plasmon resonance of Au nanoparticles with these PL centres would lead to develop new optoelectronic and light source devices.

To study this process we implanted 2 MeV Au ions at room temperature with a fluence of 5×10^{16} ions/cm², following a 60 minute thermal annealing at different atmospheres and temperatures between 1000°C to 1100 °C. The different size distributions were determined via Small Angle X-ray Scattering, while the structural parameters were determined by EXAFS [2]. As a result, Au nanoparticles with an average radius between 1-8 nm were found, where the size distribution showed a strong dependence with N concentration.

[1] Huang R. et al., *Bright red, orange-yellow and white switching photoluminescence from silicon oxynitrides films with fast decay dynamics*, Opt. Mat. Express **2** 205 (2014)

[2] Giulian R., et al., *The influence of annealing conditions on the growth and structure of embedded Pt nanocrystals*, J. Appl. Phys. **105** 2 044303 (2009)

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