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## INVESTIGATING SODIUM ALUMINIUM SILICATE CRYSTALS FOR LASER COOLING APPLICATION

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In the search for a laser cooling Nano-material a method to use in the laboratory to synthesize a suitable Nano-aluminium silicate is introduced.

The last decade has seen tremendous development in Nano- photonics and laser optical cooling, thus interest in the synthesis and use of laser to cool certain materials has grown too.

The possibility for commercial use of laser in cooling materials in industry has further excited physicists and materials scientists to research into materials that cool when they are excited by tuned lasers beams.

In this report we present one such special Nano – material in the form of Sodium aluminium silicate.

Sodium aluminium-silicate exhibits laser photonic cooling characteristics at ambient condition.

Materials that exhibit such characteristics are mostly reactive or unstable at room temperature and standard pressure. The challenge has been to synthesize a stable Nano-material that has laser optical cooling characteristics that can be investigated under normal laboratory conditions.

A hydro thermal process was used to synthesize the purest possible crystals of Sodium aluminium silicate crystals, the Crystals were then characterized using the following methods.

XRDP-X-Ray Diffraction Powders,

SEM- Scanning Electron Microscope,

EDS-Energy Dispersion X-rays,

X-ray Photoelectron Spectroscopy and

UV-Vs Ultraviolet-Visible Spectroscopy amongst others.

In the characterization the morphology, crystalline size, chemical composition and thermal stability at room temperature were investigated.

The EDS and XPS results were in agreement in the composition of the constituent compounds, The XRDS gave us the approximate chemical structure of our aluminium silicate.

Infra-red peaks in the near Infra-red, visible region suggested a possibility of up-conversion with emission in the visible spectrum region.

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