



## MAGNESIUM ALUMINATE SCANDIUM OXIDE ON VARIOUS SUBSTRATES FOR NITRIDE FILM OVERGROWTH

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### Overview

Attempts have been made to develop SAM-on-sapphire substrates that include a thin film of SAM on an underlying bulk sapphire support for InGaN growth. However, the SAM films grown by the published methods have a significant spinel phase fraction, which results in polycrystallinity and a root-mean-square (RMS) surface roughness (e.g., 2 nm) that renders them unsuitable for the growth of very high-quality crystalline InGaN.

### The Invention

UW-Madison researchers have developed novel zero spinel phase ScAlMgO<sub>4</sub> structures and methods for making them. A sputtering target is used along with a low-temperature deposition method, with optimized radio frequency (RF) sputtering parameters. This significantly reduces the impurity compared to atomic layer deposition (ALD) methods. The use of these methods enables control of both the stoichiometry and the film roughness. This method eliminates the persistent problem of a spinel phase and achieved the first demonstration of green LED on crystalline ScAlMgO<sub>4</sub> on sapphire.

### Additional Information

#### For More Information About the Inventors

- [Shubhra Pasayat](#)
- [Chirag Gupta](#)

#### Tech Fields

- [Semiconductors & Integrated Circuits : Components & materials](#)
- [Semiconductors & Integrated Circuits : Design & fabrication](#)

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