

METHOD FOR THE SYNTHESIS OF GALLIUM NITRIDE WITH N₂ GAS AT ROOM TEMPERATURE

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PATENT STATUS

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United States Of America	Published Application	20260078003	03/19/2026	2022-138

BRIEF DESCRIPTION

Gallium nitride is an essential semiconductor material that has shown great promise in electronic and optoelectronic applications. Its synthesis traditionally requires high temperatures (~300-1000°C) and/or pressures (~1-100MPa) in order to break the strong bond in molecular nitrogen. Manufacture of gallium nitride and similar semiconductor materials under these conditions is very expensive. Additionally, artificial nitrogen fixation in the form of ammonia manufacture is critical to the global food supply, but similarly requires very expensive high temperature and/or pressure synthesis.

To address these problems, researchers at UC Berkeley have developed a method to synthesize gallium nitride from molecular nitrogen at approximately room temperature (30°C) and atmospheric pressure. This process can be accomplished more cheaply than traditional methods, using only standard reagents and equipment. Researchers have confirmed that prior to the synthesis of gallium nitride, atomic nitrogen is freely dissociated. This suggests that a similar method can be used in the manufacture of other nitride semiconductor materials, or even of nitrogenous substances such as ammonia.

SUGGESTED USES

Manufacture of gallium nitride, and possibly other semiconductor nitrides or substances such as ammonia at room temperature and atmospheric pressure.

ADVANTAGES

Much cheaper than traditional methods. This novel process fixes nitrogen from molecular nitrogen gas, which is cheap and abundant.

RELATED MATERIALS

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OTHER INFORMATION

KEYWORDS

Gallium nitride, Nitride
semiconductors, Semiconductor
synthesis, Haber process, Fertilizers,
Ammonia

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