# Indium nitride

From Wikipedia, the free encyclopedia
(Redirected from InN)

**Indium nitride** (InN) is a small bandgap semiconductor material which has potential application in solar cells and high speed electronics.[2]

The bandgap of InN has now been established as ~0.7 eV depending on temperature[3] (the obsolete value is 1.97 eV). The effective electron mass has been recently determined by high magnetic field measurements ,[4][5] m*=0.055 $m_0$. Alloyed with GaN, the ternary system InGaN has a direct bandgap span from the infrared (0.69 eV) to the ultraviolet (3.4 eV).

Currently there is research into developing solar cells using the nitride based semiconductors. Using the alloy indium gallium nitride (InGaN), an optical match to the solar spectrum is obtained. The bandgap of InN allows a wavelengths as long as 1900 nm to be utilized. However, there are many difficulties to be overcome if such solar cells are to become a commercial reality. p-type doping of InN and indium-rich InGaN is one of the biggest challenges. Heteroepitaxial growth of InN with other nitrides (GaN, AlN) has proved to be difficult.

Thin polycrystalline films of indium nitride can be highly conductive and even superconductive at helium temperatures. The superconducting transition temperature $T_c$ depends on the film structure and is below 4 K.[6][7] The superconductivity persists under high magnetic field (few teslas) that differs from superconductivity in In metal which is quenched by fields of only 0.03 tesla. Nevertheless, the superconductivity is attributed to metallic indium chains[6] or nanoclusters, where the small size increases the critical magnetic field according to the Ginzburg–Landau theory.[8]

## See also

- Indium(III) oxide

## References


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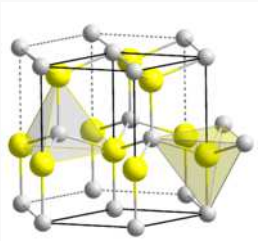
| Indium nitride | |
|---|---|
|  | |
| **Other names** Indium(III) nitride | |
| **Identifiers** | |
| CAS number | 25617-98-5 ✓ |
| PubChem | 117560 |
| ChemSpider | 105058 ✓ |
| Jmol-3D images | Image 1 (http://chemapps.stolaf.edu/jmol/jmol.php?model=%5BIn%5D%23N) |
| **SMILES** | |
| **InChI** | |
| **Properties** | |
| Molecular formula | InN |
| Molar mass | 128.83 g/mol |
| Appearance | black powder |
| Density | 6.81 g/cm$^3$ |
| Melting point | 1100 °C |
| Solubility in water | hydrolysis |
| Band gap | 0.65 eV (300 K) |
| Electron mobility | 3200 cm$^2$/(V.s) (300 K) |
| Thermal conductivity | 45 W/(m.K) (300 K) |
| Refractive index ($n_D$) | 2.9 |
| **Structure** | |
| Crystal structure | Wurtzite (hexagonal) |
| Space group | $C^4_{6v}$-$P6_3mc$ |
| Lattice constant | $a$ = 354.5 pm, $c$ = 570.3 pm [1] |
| Coordination geometry | Tetrahedral |
| **Hazards** | |
| MSDS | External MSDS (http://www.espimetals.com/msds's/indiumnitride.pdf) |
| EU Index | Not listed |
| Main hazards | Irritant, hydrolysis to ammonia |
| **Related compounds** | |

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|---|---|
| Other anions | Indium phosphide<br>Indium arsenide<br>Indium antimonide |
| Other cations | Boron nitride<br>Aluminium nitride<br>Gallium nitride |
| Related compounds | Indium gallium nitride<br>Indium gallium aluminium nitride |
| Except where noted otherwise, data are given for materials in their standard state (at 25 °C (77 °F), 100 kPa) | |
| ✓ (verify) (what is: ✓/✗?) | |
| Infobox references | |