

Volatile, thermally stable MOCVD precursors containing heavy alkaline earth and rare earth metals



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Invention

Metal-organic chemical vapor deposition (MOCVD) is used to create thin films in the production of semiconductors, superconductors and ferroelectric materials for electronic applications. However, many widely used alkaline earth and rare earth metal precursors form oligomers, resulting in low volatility. There is a need to improve MOCVD precursors in order to provide an increase in volatility and improve physical-chemical properties of the resulting materials. This technology presents heterobimetallic alkaline earth rare earth metal compounds that avoid oligomerization and thus present a new generation of precursors.

Technology

Transamination and/or ammonia activation was used to create heterobimetallic complexes. The complexes are obtained from ethereal solutions with alkaline earth or rare earth hexamethyldisilazane complexes, alkali hydrides, and simple fluoroalkoxides. The resulting metal complexes demonstrate vaporization at lower temperatures with minimal solid residue while maintaining stoichiometric control of metals in the final product.

Applications

- Semiconductors
 - Microprocessor internal structures
- Superconductors
- Photodetectors
- Ferroelectrics
 - Data storage applications
- Lasers

Advantages

- Reduction of oligomerization tendencies of precursors materials
- Increased precursor stability
- Increased precursor volatility
- Stoichiometric control of deposition products
- Clean, low temperature vaporization
- Minimal residue
- Non pyrophoric precursors



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