



Synthesis of Amorphous $\text{Si}_3\text{N}_4\text{-xPx}$ Dielectrics

AzTE Case # M10-149P

Inventors

John Kouvetakis

Professor

School of Chemistry and
Biochemistry

Background

Alternatives to silicon dioxide and silicon nitride, the traditional dielectric and passivation materials in semiconductor devices, have been the subject of intense research for the past two decades. Alloy compounds whose properties can be tuned via compositional adjustments are of particular interest. These include materials such as silicon oxynitride.

Invention Description

Researchers at Arizona State University have developed a technology that uses compositional tuning to produce a family of amorphous dielectrics with near stoichiometric $\text{Si}_3\text{N}_4\text{-xPx}$ ($x \sim 0\text{-}1$) compositions and adjustable optical response. Precise control of the reactant fluxes produces alloys in which the PSi_3 molecular core of the precursor is likely incorporated intact into the covalent nitride network. The incorporation of P systematically decreases the band gap while increasing the refractive index.

Potential Applications

- Silicon based lasers
- Silicon Photonics
- Optical Devices
- Semiconductor Applications
- Silicon based wave guides

Intellectual Property

Status:

Patent Pending

Benefits and Advantages

- Incorporation of P into SiNP lowers the band gap
- Increased refractive index
- Greater ability to tune the dielectric properties of these materials than for silicon oxynitrides

Contact

Bill Loux

Director of Business Development

Arizona Technology
Enterprises, LLC (AzTE)

480.884.1996 main

480.884.1992 desk

Email: bloux@azte.com