New UCF Optical Nanocomposite Material Can Be Drawn Into Fiber Form, Dissolved Into A Solution And Deposited As A Thin Film, Or Used As A Bulk Optical Component.

UCF researchers have invented a low loss optical nanocomposite material made of glass and high concentrations of nanocrystals (NCs). Unlike conventional crystal laser media, the new glass ceramic medium can be drawn into fiber, coated onto films, deposited as waveguides or formed as bulk optical elements. The new material has better index-matched and viscosity-tuned attributes than other doped glass/NC-containing materials, enabling high NC loading levels. Though similar materials may exhibit luminescence or random lasing in bulk form, they fail to maintain optical function like the new nanocomposite can when formed into a fiber or planar film. Well-suited for laser sources operating in wavelengths of 2 µm or greater, the material can be used for applications such as molecular spectroscopy, non-invasive medical diagnostics and atmospheric sensing.

**Technical Details**

The invention comprises an optical nanocomposite material and a process for producing said material, which is made of glass and active NCs (rare earth or transition metals). The material creates a matrix which is index-, dispersion-, and thermo-optically matched, enabling the creation of a glass ceramic with unique optical properties. By further tuning the viscosity of the composite, it can be drawn into fiber form, dissolved into a solution and deposited as a thin film, or used as a bulk optical component.

One example use of the invention blends nanosized crystalline powders (NCs) with multicomponent chalcogenide glass (ChG) to form an optical nanocomposite of glass/NCs with matching optical properties (index, dispersion, dn/dT). Specialized methods ensure homogeneous physical dispersion of NCs within the glass matrix during preparation, while minimizing agglomeration and any mismatch in the coefficient of thermal expansion.

**Benefits**

- Higher loading levels of nanocrystals make the preform suitable for drawing into optical fibers
- Enables fabrication under elevated temperatures during fiber drawing or in unique chemical or thermal environments, such as during thin film deposition

For more information, contact:

John Miner | 407.882.0342 | john.miner@ucf.edu | Tech ID #33951

UCF Office of Technology Transfer | 12201 Research Parkway, Suite 501, Orlando, FL 32826
• Can be used for any wavelength region where the NC and glass matrix are transparent

Applications

• Mid-infrared fiber lasers and sensors
• Hand-held surgery and medical imaging
• Remote sensing of chemical and biological agents
• Laser spectroscopy

Technology #33951
• Provisional Patent Application Filed

Inventors

Kenneth Schepler, Ph.D. • Kathleen Richardson, Ph.D. • Martin Richardson, Ph.D. • Chanelle Arias • Myungkoo Kang

For more information, contact:
John Miner | 407.882.0342 | john.miner@ucf.edu | Tech ID #33951
UCF Office of Technology Transfer | 12201 Research Parkway, Suite 501, Orlando, FL 32826