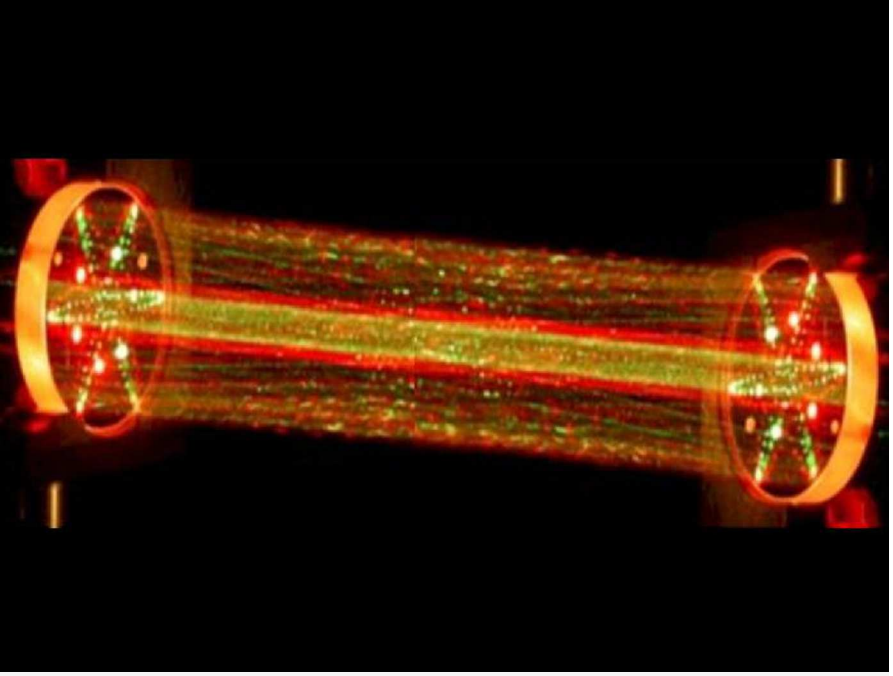


National Aeronautics and
Space Administration

technology solution

Materials and Coatings

Laser-induced Fabrication of Metallic Interlayers and Patterns in Polyimide Films

Three-dimensional control of metal formation

NASA's Langley Research Center has developed a method of using a coherent laser to process polyimide films impregnated with a soluble solution of palladium metal in a novel way to produce controlled metal layers in-situ. The laser allows patterning in the x and y dimensions and can accurately embed metal layers at different depths in the polymer films by controlling the intensity of the laser radiation. NASA Langley Research Center is actively seeking partnerships and collaborations to commercialize its Metallized Polyimide Thin Film Technologies.

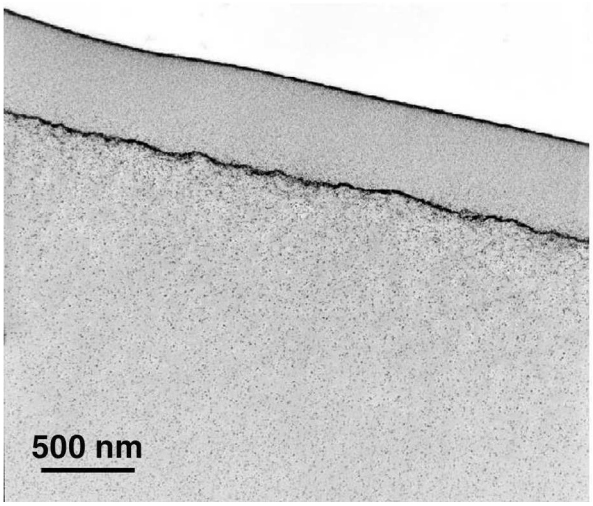
BENEFITS

- Two-step processing route requires just minutes to produce patterned metal traces at different depths in polyimide films
- Laser-induced fabrication of metallic interlayers and patterns in polyimide films produces controlled metal layers
- This new method provides a simplified process for manufacturing embedded flexible electronic microcircuits and metallic contact patterns for small plastic displays such as camcorders

THE TECHNOLOGY

The metallic interlayers and patterns are produced in the polymer by a combination of ultraviolet (UV) laser processing and thermal curing. These films exhibit photoactive properties that can be tailored for optical devices, such as reflectors and mirrors, by controlling the intensity of a coherent laser to embed metal layers at different depths in the polymer films.

These novel photo-assisted self-assembled nanoparticle films exhibit significant absorption in the optical and near infrared regions and change dimensions on exposure to radiation. They display mechanical properties similar to bi-metallic strips. These films have potential applications in electronics and optics, such as MEMS switches and opto-mechanical isolator switches. Also, the ability to deform the film surface layer may enable some form of adaptive optics.



Metallic interlayer formation

APPLICATIONS

The technology has several potential applications:

- Fabry Perot filters
- Narrow band-pass filters
- Embedded flexible electronic circuitry
- Optical switches and filters
- Optical pumps, valves for capillaries or conduits
- 3-dimensional storage devices
- Efficient small polymer displays
- Deformable antennas
- Micro-electromechanical (MEMS) switches

PUBLICATIONS

Patent No: 7,758,927

More Information

National Aeronautics and Space Administration

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NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

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