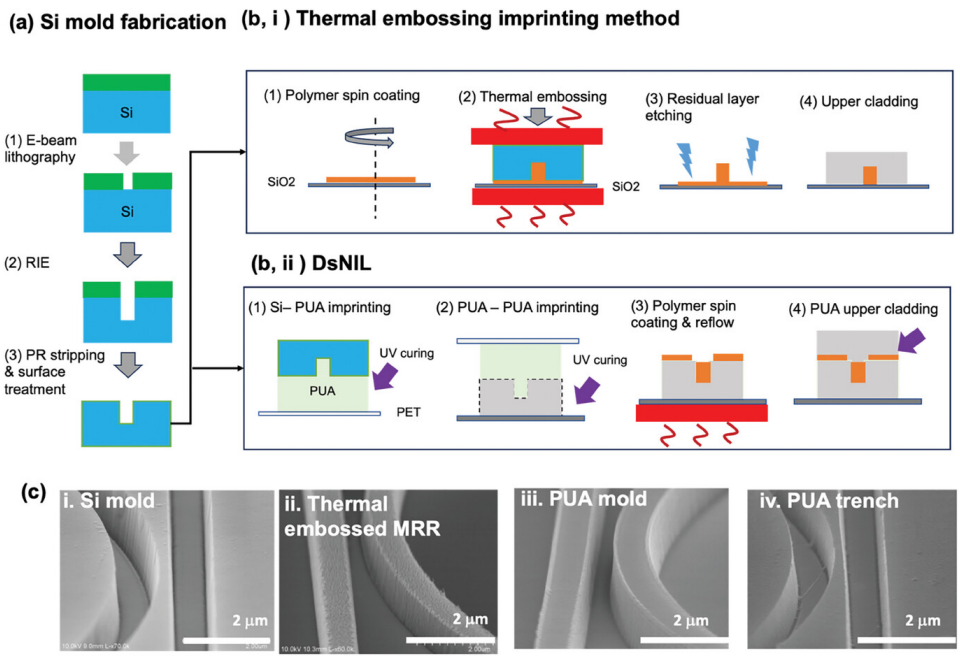
Polymer-based Microring Photonic Resonators and Method of Fabricating the Same

TECHNOLOGY NUMBER: 2024-170



OVERVIEW

A novel fabrication method for high-performance polymer microring photonic resonators, enabling efficient and scalable production for advanced applications.

- Enables high-quality factor resonators with minimal light loss, rivaling the best reported performance in polymers.
- Unlocks rapid, cost-effective, and residue-free mass manufacturing compatible with standard lab environments.

BACKGROUND

Photonic resonators are pivotal in fields such as biomedical diagnostics, telecommunications, and quantum computing due to their ability to manipulate and filter light with extraordinary precision.

Current techniques for fabricating high-quality resonators demand expensive equipment (like E-beam lithography) and strict, clean environments, restricting innovation and rapid scaling. Furthermore, persistent challenges such as feature size control (under 100 nm), surface roughness, and unwanted material residues cause energy loss and lower device performance.

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Category

Hardware
Life Sciences
Engineering & Physical Sciences
Innovation Spotlight

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As demand surges for smaller, more efficient integrated photonic devices—fueled by trends in wearables, quantum tech, and advanced sensing—there is an urgent market need for affordable, high-throughput yet precise manufacturing solutions.

INNOVATION

This new fabrication approach, called damascene soft nanoimprinting lithography (DsNIL), produces polymer microring resonators with superior quality and efficiency.

Unlike conventional nanoimprinting, DsNIL leaves no residual layers—that commonly cause energy losses—while dramatically reducing defects. The method delivers extremely fine ring features with great speed, and achieves high performance (demonstrated with a Q-factor of 500,000).

Key advantages:

- No need for specialized equipment or cleanroom facilities, making it extremely accessible.
- Fast, scalable, and suited for mass production, enabling wafer-scale device arrays in just minutes.
- Solves the drawbacks of both E-beam and conventional nanoimprinting, meeting the market demand for next-gen photonic integration at low cost and high quality.

ADDITIONAL INFORMATION

REFERENCES:

"High Q-Factor Polymer Microring Resonators Realized by Versatile Damascene Soft Nanoimprinting Lithography"

INTELLECTUAL PROPERTY:

Patent application pending