INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Dynamic Nano Inscribing Process and Apparatus

TECHNOLOGY NUMBER: 4394

OVERVIEW

Creating continuous nanograting patterns rapidly in various materials with Dynamic Nano Inscribing

- Eliminates thermal/UV curing and prevents damage to sensitive materials
- Bioindustries, optical industries, data storage, and conductive polymer patterning

BACKGROUND

Nanoscale grating and channel structures are essential in numerous cutting-edge fields such as biotechnology, optics, and data storage. Traditional methods like laser interference lithography, nano ruling, and nanoimprint lithography have paved the way for nanoscale patterning. Among these, roll-to-roll based nanoimprint lithography (R2RNIL) stands out for its high throughput and impressive resolution. However, R2RNIL necessitates thermal or UV curing steps, which can be incompatible with many functional polymers and may damage bio-sensitive organic materials. Furthermore, achieving large-area continuous patterns is challenging due to the need for same-size original molds, and the imprinted patterns are typically not truly continuous because of seams where the flexible mold ends meet. This necessitates improved methods to address these incompatibilities and limitations, to achieve a consistent and material-preserving nanofabrication method.

Technology ID

4394

Category

Hardware
Engineering & Physical Sciences
Semiconductor, MEMS, and Electronics

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INNOVATION

University of Michigan researchers have unveiled a breakthrough nanofabrication technique called Dynamic Nano Inscribing (DNI). This innovative process allows for the creation of inherently continuous nanograting patterns across various metal and polymer materials at fast speeds (~10 cm/sec) in ambient conditions. DNI can produce line widths as narrow as 70 nm, preserving the functional integrity of materials sensitive to heat, UV radiation, or chemical treatments. Furthermore, DNI can pattern nanostructures on a wide range of substrates, offering unique versatility. This gentle yet highly efficient method is particularly advantageous for the rapid, reel-to-reel patterning of conductive polymers, making it ideal for applications in bioindustries, optical industries, data storage, and flexible substrate patterning. By avoiding additional chemical processing steps, DNI also simplifies the fabrication process while ensuring low cost and high parallel fabrication capabilities.

ADDITIONAL INFORMATION

INTELLECTUAL PROPERTY:

US8752608 "Dynamic nano-inscribing for continuous and seamless metal and polymer nanogratings"