Large Area Soft Mold Using Precision Step & Repeat Align Process and Roll-to-Roll UV Imprint Process Using It

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Ultraviolet (UV) imprint lithography based on a roll-to-roll (R2R) system has been attracted attention as a next-generation patterning process because it can replicate micro/nano scale structures precisely and reproducibly at low cost and improve process speed and productivity compared to the existing lithography method.
In practice, however, it is very difficult or very costly to produce pattern roll molds of micro/nano structures. Therefore, we developed a step & repeat mold fabrication equipment with precision alignment system and used it to make 300mm ×1000mm large size soft mold having very fine and complicate patterns. Also, we developed a soft mold winding machine with precision position and tension control function and fabricated a pattern roll mold. Finally, we applied the fabricated pattern rolls to our own roll-to-roll UV imprint process equipment to perform several application tests including simple test patterns, super-hydrophobic film, and anti-counterfeiting hologram patterns.
In this presentation, we will describe the main components and functions/capabilities of the developed equipment. And, we will discuss the test results and major issues of the equipment and processes developed.

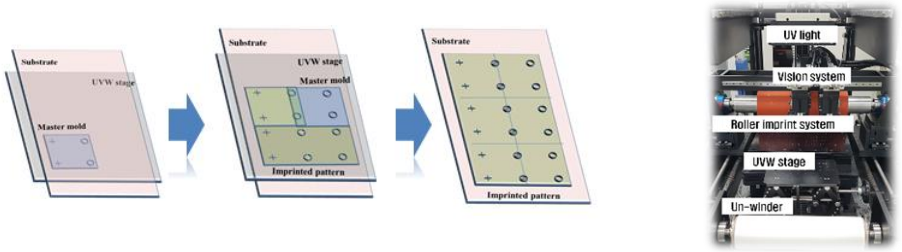

Figure 1. Step & Repeat precision align process and developed equipment.

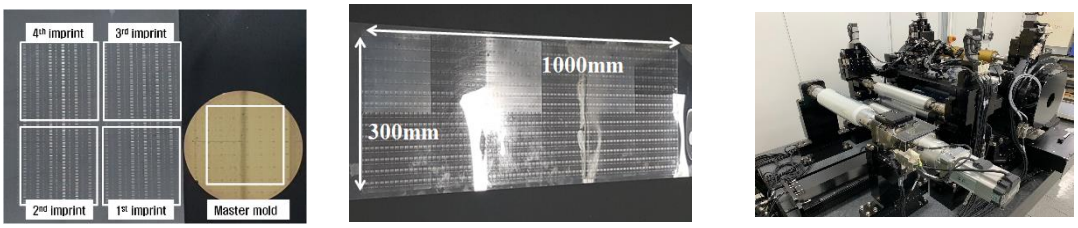

Figure 2. Fabricated large-area soft mold and developed soft-mold winding machine.

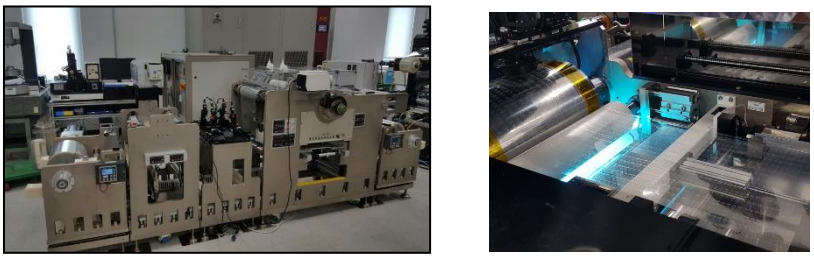

Figure 3. Roll-to-roll UV imprinting system.

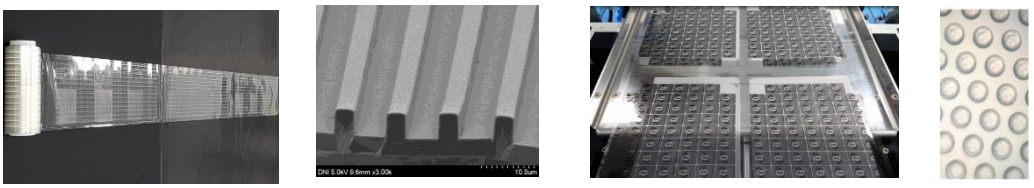

Figure 4. Some test results.

Reference:

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