

Unique anti-reflective and self-cleaning plastic films to be ramped up for industry use

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Fast, high-volume production of plastics with specially engineered surfaces will soon be available using a cheaper and simpler method. IMRE and its Industrial Consortium On Nanoimprint (ICON) partner companies are piloting roll-to-roll nanoimprint technology to mass produce two types of patterned nanoimprinted plastic films. These are films with low reflectivity and better viewing angles, as well as durable, scratch-resistant films with 'self-cleaning' surfaces. This technology can be more cost effective than conventional batch production as ICON uses roll-to-roll processing, which enables the continuous, high throughput production of such materials on a large scale. Potential applications of such mass-produced anti-reflective films are in the mobile device and tablet markets while the self-cleaning plastics can be applied to surfaces such as walls of buildings.

IMRE and five companies, namely, Innox Higa Singapore Pte Ltd, Micro Resist [Technology](#) GmbH, NTT Advanced Technology, SABIC Innovative Plastics and Solves Innovative Technology will work together to develop the materials and scale up production of the films.

Nanoimprinting technology involves creating arrays of very tiny, nano-sized surfaces to form unique patterns that give the surfaces certain properties such as low reflectivity, super-hydrophobicity (water repelling), non-sticky adhesiveness or anti-bacteria qualities. In this collaboration, the partners are developing tougher resins for the nanostructures that are then patterned onto the plastics via IMRE's unique nanopatterning processes. The process is then easily scaled up using ultraviolet roll-to-roll nanoimprinters so that the films can be used

in eventual prototyping on surfaces and devices.

“The partnership with industries to advance the technology towards scale-up will bring nanoimprinting technology a step closer to full industry adoption,” said IMRE scientist Dr Low Hong Yee adding that one of the goals of ICON has been to nurture nanoimprint technology from a primarily laboratory-based process to one with industrial manufacturing and consumer application potential.

“Nanoimprinting is a very versatile and extraordinary technology that turns ordinary surfaces into functional ones. It is also encouraging to see the translation from science to large-scale manufacturing in such a short span of time,” said Prof Andy Hor, Executive Director of IMRE.

“We are a company that specialises in photoresists and polymers for micro and nanolithography. Within the ICON project, we will provide tailor-made polymer materials for nanostructured functional [films](#). It is a unique opportunity for us to adapt materials specifically for roll-to-roll processes as well as for “hard” industrial requirements which cannot be achieved by today’s off-the-shelf materials. This will strengthen Micro Resist Technology’s market business prospects as global supplier of materials for next-generation lithography and nanolithography,” said Dr Marko Vogler, Business Unit Manager, Nanoimprint Materials and Hybrid Polymers, Micro Resist Technology GmbH, Germany.

“SABIC Innovative Plastics is excited to be part of this ICON project. It is a unique platform provided by IMRE for us to access advanced nanoimprint technology and enhance our core competencies to provide innovative solutions to our customers and end users in various market segments,” said Dr Mahari Tjahjadi, Technology Director, Specialty Film & Sheet, SABIC Innovative [Plastics](#).

“This is a very exciting time for us from the perspective of a local

company. Since being involved in the pioneering development of cutting edge technology can put us on the global map, Solves is ready to support mass production using nanoimprint technology!” said Mr Koh Teng Hwee, Managing Director of Solves Innovative Technology, a local small and medium enterprise (SME) that helped co-develop the UV roll-to-roll tool with the IMRE team.

The pilot manufacturing project will last a year after which the consortium can further develop and market the technology.

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