Anti-Reflective Standard Stamp

HIGH PERFORMANCE VERSION

NIL TECHNOLOGY

Introduction

AR surface structures reduce the reflectivity from polymer surfaces down to below 0.6%. Our state of the art nano-optical imprinting stamps represent the result of years of optical design work and cutting edge origination process development.

The AR standard stamps have been specifically designed for high performance AR R&D work, as well as for product and process development. This AR standard stamp is available in two sizes:

1. 70 mm x 70 mm with an active area of 50 mm x 50 mm
2. 120 mm x 120 mm with an active area of 100 mm x 100 mm

How the Anti-Reflective Stamp works

Imprinted AR nanostructures are able to modify the optical properties of any formable material and reduce the reflection from this surface. As opposed to AR-coatings no additional material and costly coating processes are required

The AR effect is achieved by modification of the surface topography on sub-wavelength scale through nano-imprinting. The AR nanostructures make use of the bio-inspired moth-eye effect. The surface topography creates a gradedindex profile, which reduces visual reflectance of a surface with n=1.5, to air with n=1, from 4% down to below 0.6%.

Anti-Reflective Applications

- Optical components, windows and covers in optical systems
- Surfaces and covers of flat panel displays and other display surfaces
- Optical films
- Thin film and organic photovoltaics
- Transparent covers used in industrial equipment, automotive, consumer electronics, architecture

Users of Anti-Reflective Standard Stamps

- Film manufacturers - for product and process development work
- R&D institutes - for research activities on nanostructured surfaces
- Manufacturers of equipment for injection molding, thermal embossing and roll-to-roll production - as a reference to demonstrate the technical capabiltites and homogeneity of their production processes

Quality Control

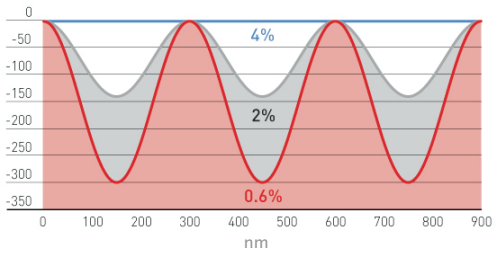
Prior to shipment the quality of the AR stamp is controlled by visual inspection. The result of the inspection is summarized in a quality control sheet where the identified defects are marked. Typical defects on the AR stamp are small pinholes or blackholes, in rare cases also other defect types might occur, e.g. wash marks or stains, having almost no influence on optical functionality in polymer replicas. The defect density in the active area is less than 1% of the total area.

Specifications

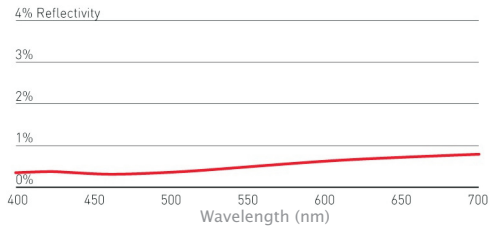
	AR-B	AR-D
Optical function	AR High performance	AR High performance
Grating type	Hexagonal array	Hexagonal array
Pitch	300 nm	300 nm
Average depth	350 nm	350 nm
Stamp thickness	100 µm - 300 µm	100 µm - 300 µm
Expected %R PMMA	Less than 0.6%	Less than 0.6%
Stamp size	**70 mm x 70 mm**	**120 mm x 120 mm**
Active area	**50 mm x 50 mm**	**100 mm x 100 mm**

Anti-sticking layer (ASL) and dicing are optional

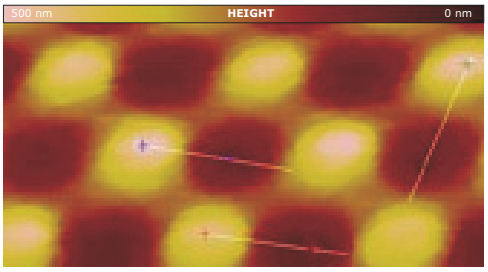
Reflectivity vs. structure depth



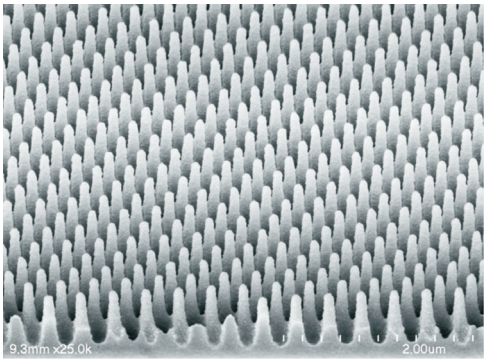
Visual Reflectivity



AFM Scan of the AR Stamp Structures



SEM Image of the AR Stamp Structures



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