

Fabrication of overhanging triangular gratings

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We have developed a novel fabrication process for overhanging triangular gratings. Such gratings are of interest for example in back lighting of mobile devices. As a substrate we used 5" quartz mask plate with 100 nm low reflective chromium. In the first step we spin coated the substrate with ZEP 7000-22 resist from Zeon Corporation. We patterned the sample with Vistec EBPG5000HR+ES HR electron beam patterning tool and developed the sample in ethyl 3-ethoxypropionate and rinsed it with isopropanol. The period of the patterned structure was 565 nm and the line width 210 nm. After the development we etched the chromium layer with the resist mask in chlorine atmosphere with PlasmaLab 100 RIE system from Oxford Plasma Technology. The sample was then etched with Ionfab 300 Plus reactive ion beam etcher from Oxford Plasma Technology in Ar/CHF₃ atmosphere. Etching parameters and the sample's angle to the ion beam were varied during etching. After removing the remaining chromium, the sample was given an anti-adhesion treatment using alkyltrichlorosilane. Then the structure was replicated usingOrmocer-material, Ormocomp US-S4. The depth of the structure was 420 nm. The profile of the copied structure is shown in figure 1. In further work the flat region in the bottom of the structure will be shortened.

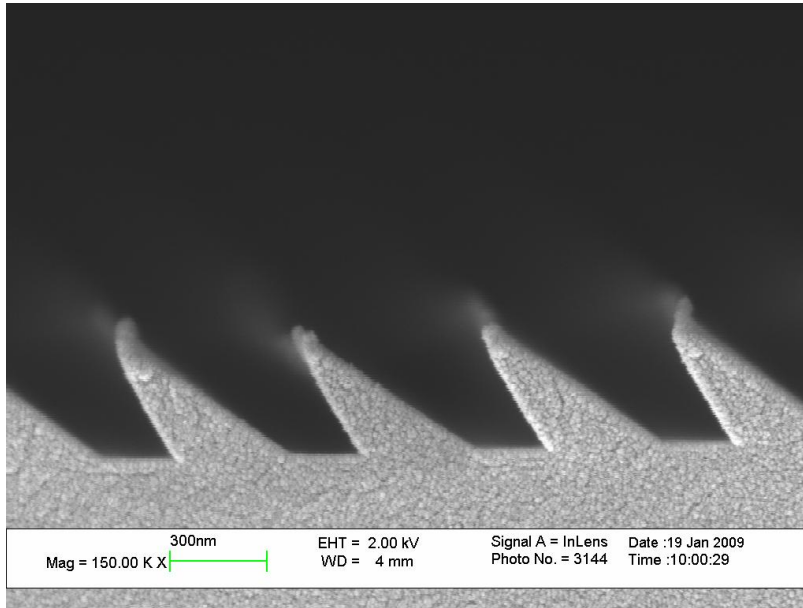


Fig. 1: The profile of replicated overhanging triangular grating with the period of 565 nm.