A fabrication of nanostructures by controlling a gap distance in a transmission and a diffraction light

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Recently, the photolithography is the most widely used technique in nano / microscale pattern manufacturing. This technique can produce patterns quickly and inexpensively over a relatively large area compared to other methods. However, since conventional photolithography has a fundamental cause of diffraction limit, it is difficult to fabricate a very small nano-sized pattern. Many techniques, such as Extreme Ultraviolet (EUV) lithography, nanoimprint lithography, dip pen lithography, and plasmonic lithography, have been studied to overcome these limitations in order to make the pattern smaller. EUV lithography has reduced resolution by using a laser with a wavelength of 13.5 nm in conventional photolithography. Nanoimprint lithography is a method of continuously forming patterns using fabricated molds, and dip pen lithography produces patterns directly using atomic force microscope probes in liquid inks. Unfortunately, these techniques are difficult to fabricate over a wide range of patterns and require a high amount of cost and a long time. We have adopted plasmonic lithography using a nanohole array metal mask to overcome this limitation. This method uses a beam of an Extraordinary Optical Transmission (EOT) phenomenon generated by collective oscillation of electrons at the metal and dielectric interfaces, so that a smaller size pattern can be produced. In this study, we designed an experiment to observe the fabricated nano-sized structures by the diffraction and the transmission light. Also, we experimented with the gap distance between the mask and the photoresist, such as Talbot lithography.

Biography: Taeyeon Kim is a Ph.D student majoring in Cogno-Mechatronics Engineering at Pusan National University in Republic of Korea. He also worked in Optics and Mechatronics engineering as a bachelor and in Cogno-Mechatronics engineering as a master's degree at the same university. He is currently working in the Nanobiophotonics laboratory under the guidance of professor Kyujung Kim. Nanobiophotonics Laboratory investigates plasmon based optical imaging and optical sensing techniques to visualize molecular interactions in biological applications, and interests in developments of optical medical devices. Currently he is studying to fabricate a smaller-sized pattern on a large area by combining plasmonics with nanolithography technology.

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