Successful Development of a Desktop Apparatus Enabling Nanometer-scale Fabrication

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We have developed a new thermal lithography technique that utilizes the thermal decomposition of platinum oxide. This technique enables lithography of high resolution, high speed and wide writing area (96 cm^2). The smallest reproduced feature was 50 nm in diameter, using an optical system consisting of a 405 nm laser and an objective lens with numerical aperture (NA) of 0.65. Size of this feature is one eighth of that achievable by conventional photolithographic techniques. High-speed writing of over 6 m/s was achieved, with 3 million nano-dots fabricated per second. With the technique, nano-scale devices will be produced at lowcost.

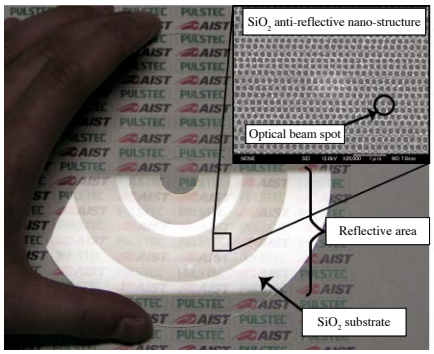

Figure 1: A photo image of an antireflective nano-structure formed on a SiO_2 disc substrate of 12 cm in diameter.

Figure 2: The jointly-developed desktop nano-fabrication apparatus.

Uniform dispersion of carbon nanotubes into polyimide

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We developed a new method for dispersing carbon nanotubes in polyimide with nano-meter-scale uniformity. This material is a new promising nonlinear optical material with transparency, thermal durability, robustness and processibility. A fiber laser using this material generated a very short light pulse with 165 femto second width. With a fine microfabrication technology, a waveguide device was fabricated using this material.

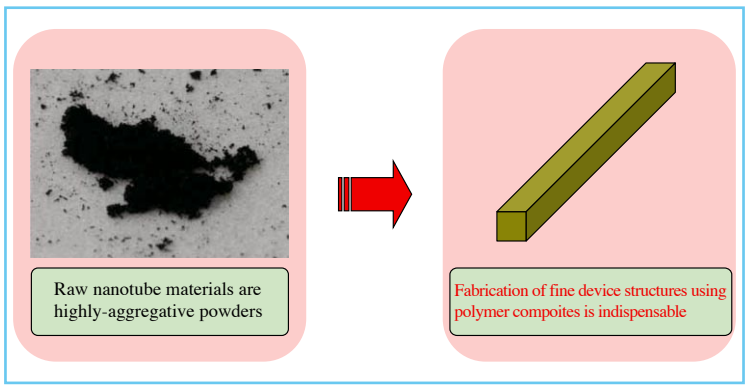

Figure : Necessity to develop a nanotube-polymer composite material