

**Study of optical micro systems
by monolithic integration of silicon with nitride semiconductor**

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【Outline of survey】

Integrating silicon three-dimensional structures and microactuators with nitride optical devices monolithically, highly functional and integrated optical MEMS (Micro-Electro-Mechanical Systems) can be developed. In this project, the monolithic integration of silicon MEMS with nitride semiconductor light sources is studied, and some prototypes will be fabricated. The purposes of the project are as follows. 1) To develop MEMS technology for the planar silicon substrate on which nitride semiconductor is deposited. 2) To study MEMS technology for the micromachined silicon substrate on which nitride semiconductor is deposited. 3) To investigate micromachining for nitride semiconductor. 4) To fabricate basic prototypes of nitride-silicon MEMS. The examples of the prototypes are variable lightning device, micro spectroscopic system for bio-analysis, optical scanner, tunable laser, optical interconnection device etc. Based on the above proposed technologies, the application areas of MEMS will be expanded and a new research field of nitride semiconductor will be emerged.

【Expected results】

Developing the micromachining for the MEMS consisting of silicon and nitride semiconductors, the basis for new MEMS will be established. For the future progresses of nitride semiconductor substrates and devices, the assembling and integration technologies are indispensable. Since the optical, electronic and micromechanical components can be integrated by the proposed technique, it provides a new assembling and fabrication technology. The examples of the applications are variable lightning device, micro optical system for bio-analysis, integrated optical sensors for mechatronics, wavelength tunable optical devices.

【References by the principal investigator】

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【Term of project】 FY2007—2011

【Budget allocation】 18,900,000 yen
(2007 direct cost)

【Homepage address】

<http://www.hane.mech.tohoku.ac.jp>