

**World Center of Education and Research for Trans-disciplinary Flow Dynamics
International Internship Program**

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Research title: Nondestructive Material Characterization using Ultrasound

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My research topic in Institute of Fluid Science (IFS) is nondestructive material characterization using ultrasound. Especially, I mainly used chemical vapor deposition diamond (CVD diamond). The characteristic features of CVD diamond were changed by the deposition conditions such as deposition temperature, kinds of substrate material, deposition time and surface roughness etc.. These conditions are destabilizing factor which influence the quality of deposition process, and diamond film after deposition. Therefore, nondestructive evaluation of CVD diamond is recommended to improvement of its quality.

For achievement of this purpose, I prepared the CVD diamond specimens with various deposit conditions and evaluate the CVD diamond coating by using various nondestructive methods such as Optical microscope, X-ray diffraction, scanning electron microscopy (SEM) and acoustic microscope.

Optical Microscope is convenience tool for roughly observation of surface condition. And size of diamond could be estimated by using X-ray diffraction. Using SEM photos, small grain or particle could be observed and acoustic microscope enables to detect flaw Flaws of dozens of micro meter.

Ultrasonic testing has a high potential for evaluation of material characteristics, therefore, I will perform ultrasonic testing and obtain "minimum reflection profile" which measures energy variation of reflected waves from the surface of the specimens as changing the angle of incident wave from normal to beyond Rayleigh angle in a pitch-catch immersion setup. Maybe I seem to obtain good analysis result using Rayleigh surface-wave.

Finally, I would like to thanks professor T. Takagi, T. Uchimoto, Miki, all of our laboratory students, and all GCOE staff for making my trip.



(a) Farewell party for a graduate student



(b) One day trip - Matsushima



(c) Cherry blossom party



(d) with my laboratory student