平成 28 年度第１回 VBL セミナー

1st VBL Seminar, 2016

日時：平成２８年１０月１７日（月）１０時３０分～１２時００分

場所：VBL3 階ミーティングルーム

講師：Dr. Siti Machmudah (VBL 客員准教授、スラバヤ工科大学/ITS Surabaya)

題目：Sub- and Supercritical Fluids for Nano-particles Production

Abstract:

Recently, sub- and supercritical fluids have been applied in wide variety of industrial sectors including food, cosmetics, pharmaceutics, materials, chemistry, energy and waste treatment. Sub- and supercritical fluids may also be utilized for the production of fine powders. Water and carbon dioxide are usually used as a sub- or supercritical fluid solvent, because they are environmentally-friendly benign solvent. Subcritical water was employed to produce macroporous zirconia particles and composite ceria-zirconia particles. The present of ceria in the composite could improve oxygen storage capacity of the particles, while the present of zirconia in the composite could improve thermal resistance of the particles. Therefore, the composite particles may be utilized for electrolyte of Solid Oxide Fuel Cell (SOFC) with high oxygen storage capacity and thermal resistance. Supercritical carbon dioxide was also been applied for production of gold and silver nanoparticles. The modified gold and silver nanoparticles was generated with laser ablation process in supercritical carbon dioxide environment. The gold and silver particles formed were sphere particles attached nanoclusters, which is formed by networking of small sphere particles. The network structure of nanoclusters may modify the properties of nanoparticles. For pharmaceutical application, supercritical carbon dioxide was utilized for fine powder formation of carotenoids (lycopene, β-carotene, and lutein). Supercritical carbon dioxide was employed as anti-solvent of carotenoids dissolved in an organic solvent to generate fine powder. Nano- to submicron particles of carotenoids were produced by this technique without leaving residual organic solvent in the products. These results indicated that supercritical fluids technology may replace the use of organic solvent for material processing.

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