



多相复杂系统国家重点实验室

特邀学术报告

◆ 报告人 ◆ Prof. Tadafumi Adschiri

Tohoku University, Japan

◆ 报告题目 ◆ Supercritical Fluid Technology for

Green Materials

◆ 报告时间 ◆ 2011年8月25日(周四) 15:30~17:00

◆ 报告地点 ◆ 中科院过程大厦 308 会议室



报告摘要

Supercritical fluids technology is expected to contribute for new materials synthesis with the green sustainable chemistry route, especially for nanomaterials. So far, variety of materials have been developed, including ceramics, metals and polymers, but recent needs in the industries are of multi-functions of ceramics/metals and polymers to contribute for sustainable society. Composite materials might solve the problems, but in many cases trade-off of the functions are of important issues. To overcome the trade off, control of the nano-interface is the key, but nanoparticles are easily aggregated in polymer matrix because of the higher surface energy of NPs, and thus it has been considered a difficult task. Organic functionalization of inorganic nanoparticles is required to have higher affinity between NPs and polymers. The organic modification, NPs should be dispersed in an organic solvent with high concentration, which is difficult. For fabricating multi-functional materials, we proposed a new method to synthesize organic modified nanoparticles (NPs) in supercritical water. Since the organic molecules and metal salt aqueous solutions are miscible under the supercritical state, and water molecule works as an acid/base catalyst for the reactions, organic-inorganic conjugate nanoparticles can be synthesized under the condition. The hybrid NPs show high affinity with the organic solvent or the polymer matrix, which leads to fabricate the organic inorganic hybrid nanomaterials with the compatible (trade-off) functions, which contributes for green sustainable society.

Tadafumi Adschiri 教授于 1986 年获得东京大学博士学位，主要从事煤转换和能源有效利用的研究，博士期间即被选为日本学术振兴会特别研究员。1987 年任东京大学助理教授，1990 年任职日本东北大学后开始研究“超临界流体反应”这一当时全新的领域。1992 年他提出了一种在超临界水中合成金属纳米粒子的新方法，开创了超临界流体合成纳米粒子/聚合物杂化材料的先河。现主持日本政府一项经费总额达 3 千万美元的“超杂化聚合物”项目。Adschiri 教授曾荣获日本能源学会、日本化学学会、日本化工学会授予的最佳研究奖，日本文部科学省授予的部长奖以及新发明奖。近年来，多次受邀在各种国际学术会议上作大会报告和邀请报告。去年，他领导的研究团队被日本政府评为最杰出的五个研究组（世界先端水平研究据点促进项目）之一。

在本次报告中，Adschiri 教授将详细介绍他的研究小组取得的最新研究成果。

欢迎您的光临!

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特邀学术报告

◆ 报告人 ◆ Prof. Motonobu Goto

Kumamoto University, Japan

◆ 报告题目 ◆ Reaction and Material Processing by Pulsed

Power Technology in Supercritical Fluid

◆ 报告时间 ◆ 2011年8月26日(周五) 15:30~17:00

◆ 报告地点 ◆ 中科院过程大厦 308 会议室



报告摘要

We have been developing novel reaction and material processing technologies using electric pulse power in sub- and supercritical fluid media, such as, discharged plasma, laser irradiated plasma, electrospinning, and microwave process.

We have studied generation of pulsed discharge plasma in subcritical or supercritical fluids, such as carbon dioxide, water, or argon. Two-phase system, where liquid and supercritical fluid coexist, was also used as a media to generate discharge plasma. The discharge behavior was investigated in terms of breakdown phenomena.

Fabrication of nano-structured materials has been developed by performing pulsed laser ablation of copper, gold, and silver plates in supercritical CO₂. The metal nano-structured particles were successfully generated with allowing the selective generation of clusters. Both surface of ablated metal plates and structure of nanoparticles were significantly affected by the changes in supercritical CO₂ density.

Electrospinning is one of the simple methods to produce nano to submicron fibers using high voltage electric field. We conducted the experiment using a system of electrospinning in supercritical carbon dioxide. Various polymers such as polyvinyl alcohol (PVA) and polyvinyl pyrrolidone (PVP), were used as a fiber material.

Microwave irradiation in subcritical water has been used for chemical reaction or extraction process. We used the microwave process to extract bioactive components from natural materials.

Motonobu Goto, 1984 年获得日本名古屋大学化学工程博士学位后留校任教, 1988 年受聘于日本熊本大学任助理教授, 1988-1990 年赴美国加州大学戴维斯分校从事博士后研究, 1993 年任熊本大学副教授, 2001 年任教授。现兼任 *Journal of Supercritical Fluids* 期刊编委, 国际超临界流体技术发展学会联合副主席, 亚洲超临界流体学会组织者。Goto 教授长期致力于超临界流体技术的研究, 迄今已发表学术论文 200 余篇, 多次受邀在国际学术会议上作邀请报告。曾荣获日本吸附学会奖, 日本食品工程学会奖, 日本化工学会奖, 日本塑料回收利用研究协会奖。

在本次报告中, Goto 教授将详细介绍他的研究小组取得的最新研究成果。

欢迎您的光临!