

## 第 170 回物質化学セミナーのお知らせ

- 共 催 表面技術協会北海道支部, フロンティア化学教育研究センター
- 日 時 平成 28 年 11 月 17 日(木) 15:00~16:00
- 場 所 工学部 材料・化学棟 小会議室(MC527)
- 演 題 Anodic TiO<sub>2</sub> nanotubes as a platform for electrodeposited nanostructures
- 講 師 Dr. Damian Kowalski  
Faculty of Engineering, Hokkaido University
- 司 会 幅崎浩樹

### 概 要

Anodic alumina oxide (AAO) is one of the most widely used hard template materials for synthesis of electrodeposited nanostructures [1]. Anodic TiO<sub>2</sub> nanotube array [2] is even more interesting template/matrix for deposition of secondary material in view of its specific geometry, not really explored so far. Herein we discuss a general approach for building the blocks of TiO<sub>2</sub> with conjugated polymers (CP) as a model case. [3] The use of CPs, for the most part in electrochemical energy systems, is hampered by the need for processes that can perform control of their structure at the nanometer scale. For instance, recent achievements in photovoltaic devices will need further well-defined interpenetrated phases of semiconductor-polymer (*e.g.* TiO<sub>2</sub>-P3HT) or polymer-polymer (*e.g.* P3HT-PCBM) to improve their performances in view of relatively short exciton-diffusion-length which is typically 5-20 nm. We demonstrate formation of specific geometries between p-type organic polymer and n-type inorganic semiconductor. Three distinctly different polymeric patterns can be established. We further explore our system to noble metals (*e.g.* Au/TiO<sub>2</sub>), metalloids (*e.g.* Si/TiO<sub>2</sub>) and semiconductors (*e.g.* CdSe/TiO<sub>2</sub>). [4] The synthesis routes, physicochemical properties and morphological aspects will be discussed in view of possible applications of the materials.

[1] H. Masuda and K. Fukuda, *Science*, **268** (1995) 1466.

[2] D. Kowalski, D. Kim and P. Schmuki, *Nano Today*, **8** (2013) 235.

[3] D. Kowalski, and P. Schmuki, *Chem. Comm.*, **46** (2010) 8585.

[4] D. Kowalski and J. Mallet, M. Molinari, *J. Mater. Chem. A*, **3** (2015) 6655.

物質化学セミナー世話人 樋口 幹雄 (内線 6573)

本講演は、大学院総合化学院『化学研究先端講義(修士課程選択科目)／総合化学特別研究第二(博士後期課程選択科目)』の一部として認定されています。