

第690回 化学・物質工学セミナー 開催のお知らせ

この化学・物質工学セミナーは、工学研究科の未来工学研究センター講演会・第8回重点研究課題セミナー及び第6回5年一貫制博士課程グリーンシステム創成科学専攻の国際セミナーと共催します。万障お繰り合わせの上、ご参加下さい。

Chemo-Mechanical Engineering at the Nanoscale: Potential for Next-Generation Electrochemical Devices

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日時：平成30年1月26日（金）14:00～15:00

場所：総合教育研究棟2階 多目的ホール

アメリカ合衆国のマサチューセッツ工科大学のGeorge Harrington博士はHarry L. Tuller教授と、電池、燃料電池、太陽電池、光分解セルやセンサ等のエネルギー関連デバイスのプロセッシング、キャラクタリゼーションおよび機能設計法に関する研究を精力的に進めておられます。今回の講演では、特に、次世代のナノスケールで制御された次世代の電気化学デバイスについてご講演いただきます。

Abstract

Traditionally the development of new materials for electrochemical devices (such as solid oxide fuel cells (SOFCs), sensors, batteries, photo-catalysts and memristors) has been based upon new chemical compositions and structures. However, the potential of interface phenomena and size-effects has resulted in a shift in the paradigm of materials development to nano-engineering. By fabricating materials in confinement, such as in the form of thin films and multilayers, effects including space charge zones, lattice strain, and dislocations have the potential to substantially alter the reactivity and transport properties of materials for fuel cells. This field is still in its infancy, but has huge potential for the next-generation of electrochemical devices.

I will present work on controlling the defect-defect interactions by strain in lanthanide doped-ceria thin films, a common electrolyte for SOFCs. Here we look to alter the optimum dopant in $RE_xCe_{1-x}O_{2-\delta}$ by the use of applied strain, by minimizing the defect-defect interactions which limit the maximum conductivity achievable in doped-ceria.

In addition, novel nanostructured $Pr_xCe_{1-x}O_{2-\delta}$, a cathode material of SOFC, has been investigated in the form of multilayers coupled with $SrTiO_3$, in order to tailor the functional properties for implementation in next-generation electrochemical devices.

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