第286回触媒化学研究センターコロキウム（談話会）

共催　北海道大学グローバルCOEプログラム「触媒が先導する物質科学イノベーション」

Structural Studies of $Ce_{1-x}Sn_xO_2$ and $Ce_{1-x-y}Sn_xPd_yO_{2-\delta}$ by XRD, TEM, XPS and EXAFS

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Seminar Room A, Sousei Hall, Hokkaido University

（北海道大学創成科学研究棟4階セミナー室A）

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$Ce_{1-x}Sn_xO_2$ (x = 0.1-0.5) solid solutions and its Pd substituted analogue have been prepared by a single step solution combustion method using tin oxalate precursor. The compounds were characterized by X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), transmission electron microscopy (TEM), Extended X-ray absorption fine structure (EXAFS) and H_2/temperature programmed reduction (TPR) studies. DFT calculations have also been carried out on these catalytic systems. XRD patterns of as-prepared $Ce_{1-x}Sn_xO_2$ and 2 atom % Pd substituted oxide were found to be identical and could be indexed to the standard CeO_2 with fluorite structure and diffraction lines due tin-oxide or palladium oxide were not observed indicating formation of solid solutions. Both EXAFS analysis and DFT calculations reveal that in the solid solutions Ce exhibits 4 + 4 coordination, Sn exhibits 4 + 2 + 2 coordination and Pd has 4 + 3 coordination. While the oxygen in the first coordination with four short M-O bonds are strongly held in the lattice, the oxygens in the second and higher coordinations with long M-O bonds are weakly bound, and they are the activated oxygen in the lattice. Bond valence analysis corroborates these findings. Simultaneous reduction of the Ce^{4+} and Sn^{4+} ions by Pd^0 is the synergistic interaction leading to high oxygen storage capacity at low temperature.

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Sarode教授はインドのゴア大学物理学教授で、同大学自然科学部長を歴任され、現在複合酸化物の欠陥構造と触媒について、XPS、TEM，XRD、EXAFSなどで研究をされています。2005年に続き、触媒化学研究センター外国人客員教授として3ヶ月来訪され、XAFSを中心に共同研究を展開しています。よろしくご参集下さい。

本講演は『化学研究先端講義/総合化学特別研究第二』の一部として認定されています ☆

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