The Highest Efficiency of NOx Decomposition by Hyper-Structural Controlled Electrochemical Cell

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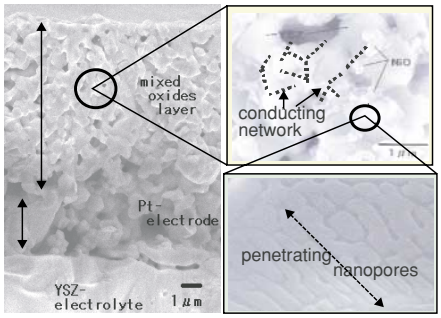
AIST Today Vol. 1, No. 11 (2001) 14

Electrochemical cells have become an important technology which contributes to many aspects of human life, industry and environment. The Environment Purification Materials team of Synergy Materials Research Center successfully designed and investigated a new family of electrochemical cells for the reduction of NO_x gases emitted from lean-burning engines. A novel cell structure has been proposed and optimized. A nano-porous composite working electrode consisting of a 3D network of pathways for the migration of oxygen ions and electrons was designed for covering a composite cathode. Nano and micro structure control allows the creation of an electrochemical cell operating at the low levels of electrical power and current required for NO decomposition in the presence of excess oxygen.



Profile micrograph of the hyper-structure controlled electrochemical cell

Selective Adsorbents for Semimetals Derived from Natural Polymer

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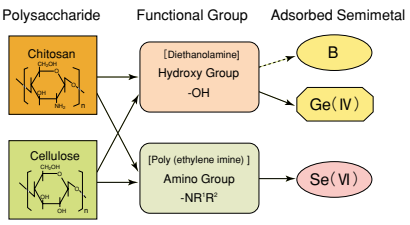
AIST Today Vol. 1, No. 11 (2001) 15

To obtain selective adsorbents for germanium (IV) or selenium (VI) derived from polysaccharide, di (2-hydroxyethyl) amine- and poly (ethylene imine)-type cellulose derivatives were newly synthesized. The di (2-hydroxyethyl) amine- and poly (ethylene imine)-type cellulose derivatives adsorbed germanium (IV) and selenium (VI), respectively, quickly and selectively from aqueous solutions containing semimetals. The cellulose derivatives adsorbed germanium (IV) and selenium (VI) more than conventional adsorbents. The selective separation of germanium (IV) or selenium (VI) from semimetals was achieved with a column method using the corresponding cellulose derivative. The germanium (IV) or selenium (VI), adsorbed on the corresponding cellulose column, was quantitatively recovered.



Selective adsorbents for semimetals derived from polysaccharide