Development of tungsten oxide nanotubes

Visible-light-driven photocatalyst for indoor application

We have developed a facile and economical method to produce nanoporous-walled WO_3 nanotubes in a large scale. These WO_3 nanotubes are monodispersed near 300-1000 nm in diameter and 2-20 μm in length. These nanotubes possess larger specific surface areas than commercial WO_3 particles. The platinum-loaded WO_3 nanotubes show a visible-light-induced photocatalytic activity in the degradation of acetaldehyde about three and eight times greater than those of commercial WO_3 particles and nitrogen doped TiO_2, respectively. Such a large activity enhancement probably arises from the nano-porous tubular structure, which results in a larger effective surface area, higher mobility of the charge carriers and more absorbed photons. This work provides a new scheme to design multicomponent photocatalysts to improve the photocatalytic activity as well as it offers a new material platform for solar cells, nanodevices, and other applications.

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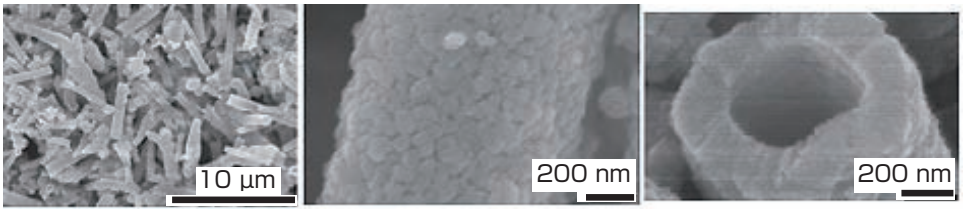
AIST TODAY Vol.8, No.11 p.20 (2008)



Scanning electron micrograph of tungsten oxide nanotube

New magnesium alloy sheet with high formability at room temperature

High stretch formability comparable to aluminum alloy sheets

Magnesium alloys have the high potential for improving fuel efficiency of vehicles and reducing CO_2 emission because of their light weight and high specific strength. For their greater applicability, it is necessary to develop rolling technologies for the mass production of high-performance magnesium alloy sheets. Critical requirements for the magnesium alloy sheets are not only high strength, but also high formability at room temperature for commercial applications. However, rolled magnesium alloy exhibits poor formability at room temperature due to strong texture formation. We have developed a new magnesium alloy sheet with excellent stretch formability at room temperature comparable to aluminum alloy sheets. The new magnesium alloy sheet is processed from hot rolling, and composed of magnesium-zinc binary alloy with dilute addition of rare earth (such as cerium). The excellent formability is attained by a modification of texture resulting from the dilute rare earth addition in magnesium-zinc alloy.

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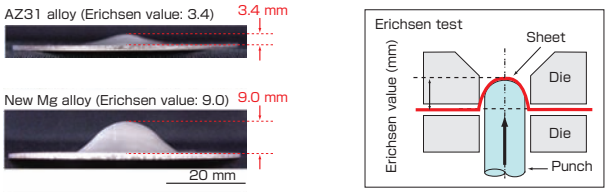
AIST TODAY Vol.8, No.12 p.23 (2008)



Results of Erichsen tests for the AZ31 alloy and the new Mg alloy