Short Communication

Effect of the Substrate Temperature on the Structural and Morphological Properties of MoO₂ Thin Films Obtained by Pulsed Injection MOCVD

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Molybdenum oxides is of great technological interest due to their outstanding optical, electronic and catalytic properties. In this work, molybdenum dioxide (MoO₂) thin films were deposited onto Si wafers and stainless steel substrates at different substrate temperatures. The growth of the films was achieved by using a vertical metal organic chemical vapor deposition reactor working in pulsed injection mode. A powder of molybdenum hexacarbonyl mixed in a toluene solution was used as precursor. An effective pulsed injection system to supply the precursor, usually used for fuel injection in internal combustion devices, delivers a precise amount of liquid precursor to the reactor through injectors, whose pulse intervals (injection frequency) are controlled by a computer-driven system. The use of a liquid solution as precursor along with the experimental parameters provide thermodynamically favorable conditions to fabricate a thin solid film, homogenously deposited onto the whole substrate. The MoO₂ film structure and morphology were studied by X-ray diffraction, Raman scattering spectroscopy and scanning electron microscopy. Moreover, a comparative study was undertaken whereby the catalytic activity of stainless steel substrate for hydrogen evolution reaction was related to that of MoO₂ thin film.

Keywords: MoO₂ thin films; MOCVD; molybdenum oxides; catalytic activity

FULL TEXT