

## Abstract

Manganese oxide octahedral molecular sieve (OMS-2) catalyst prepared by the reflux method was investigated for hydrogen generation via the water-gas shift reaction. Catalysts were characterized using X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM), The Brunauer–Emmett–Teller (BET) surface area and determination of average oxidation state (AOS). The OMS-2 catalyst showed very good catalytic activity for the water-gas shift reaction to generate hydrogen under laboratory conditions. An *in situ* study was conducted to monitor the structural changes in the catalyst during the water-gas shift reaction using synchrotron radiation-based time-resolved X-ray diffraction (TR-XRD). During the water-gas shift reaction, the mixed valent OMS-2 catalyst undergoes a structural transformation to form  $Mn_2O_3$  and finally to form MnO. The study showed that OMS-2 catalysts can be used as inexpensive catalysts for hydrogen generation.