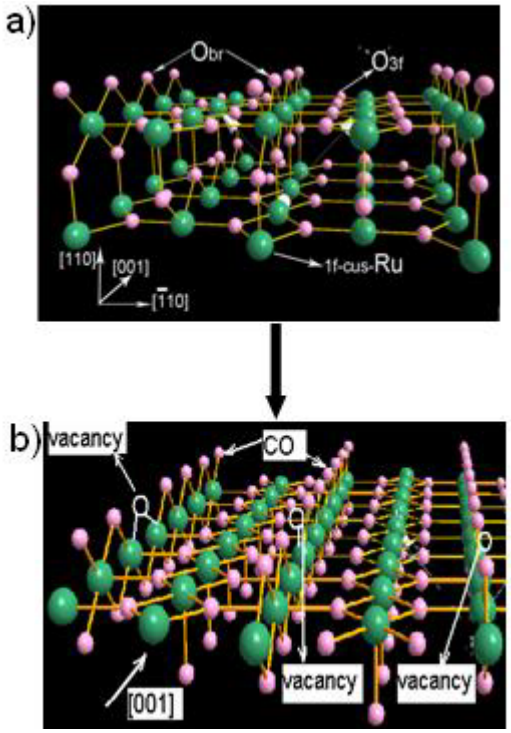
Supporting information



Scheme1. Schematic picture for the structure activation mechanism of mesoporous RuO_xH_y during the gas treatment (CO/O_2). a) Stick and ball model of the stoichiometric RuO_2 surfaces in mixed gas. O and Ru atoms are shown as large and small balls, respectively. A bridge bonded O (O_{br}) which are coordinated only to two Ru atoms underneath, a 3-fold coordinated O atom (O_{3f}), and a 1-fold under-coordinated Ru atom (1f-cus-Ru) which are coordinated only to five O atoms, are active elements, are indicated. b) Formation of O vacancy resulting from the missing O which is consumed by oxidation of CO.