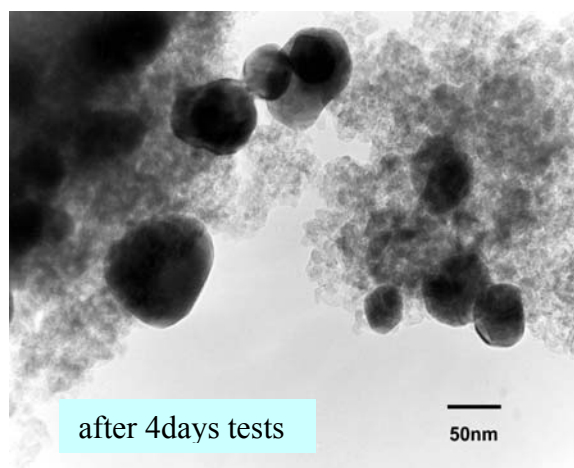
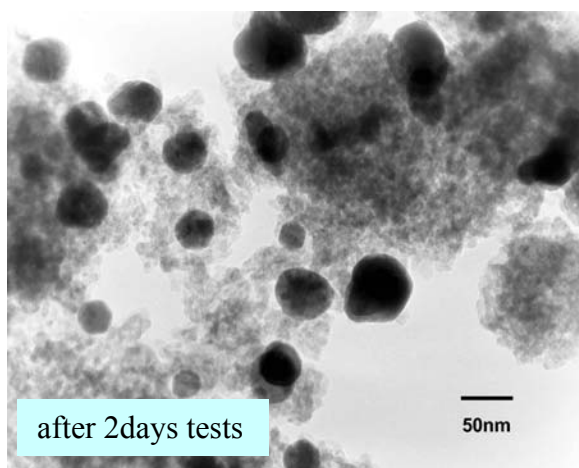
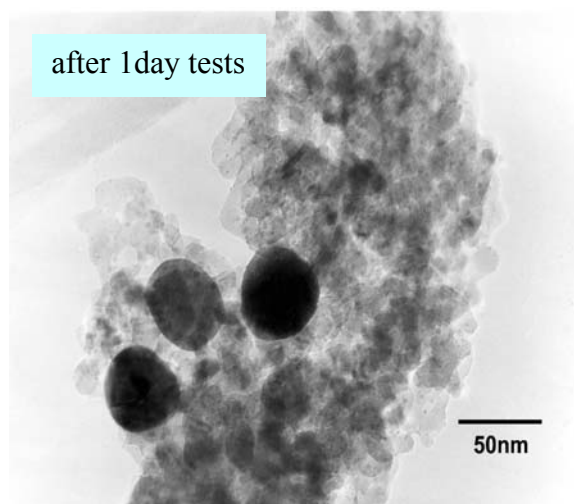
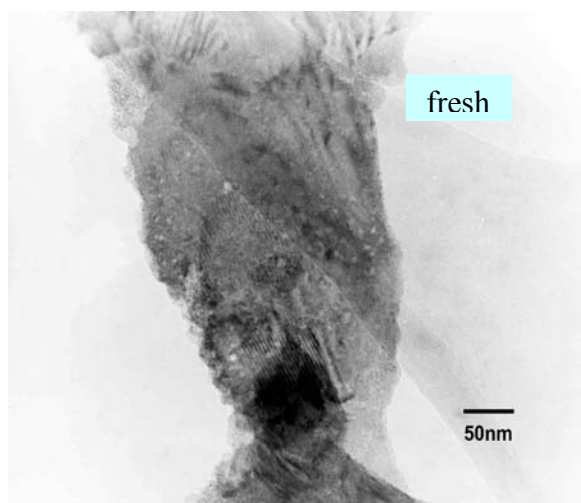


### Supplementary Data

1. Changes observed in Pd particle size of 10%Pd-8%Sb-7%Bi/TiO<sub>2</sub> catalyst at different stages of reaction



## 2. Preparation of Pd-Bi/TiO<sub>2</sub> catalysts

The catalyst preparation involves mainly two steps as described below:

In the first step an aqueous solution prepared by dissolving requisite amount of BiCl<sub>3</sub> in 2 ml of 1N HCl and 5 ml distilled H<sub>2</sub>O is impregnated on TiO<sub>2</sub> (anatase, supplied from Kronos, Germany, BETSA-315 m<sup>2</sup>/g) and the mixture was allowed to stand for 1 hour at room temperature and stirred with glass rod frequently. Next, an aqueous solution prepared by dissolving appropriate amount of ammonium sulphate in distilled H<sub>2</sub>O was added to the above slurry and the mixture was then heated for 1 hour on a water bath at 70 °C. After cooling, the resulting suspension was neutralized with ammonia and adjusted the pH to 7 and again heated for one more hour. Afterwards the slurry was filtered and dried on a rota-vapour to remove excess solvent, the resulting solid mass was further dried in an oven at 120 °C for 16 h, followed by calcination at 400°C for 3h in air.

In the second step an aqueous solution of palladium chloride was prepared by dissolving desired amount of PdCl<sub>2</sub> in distilled H<sub>2</sub>O, added few drops of Conc. HCl and heated at 60 °C for ~20 minutes to completely dissolve PdCl<sub>2</sub>. Then adjusted the pH to 4 by the addition of sodium carbonate solution drop by drop. This solution was then impregnated on the calcined sample obtained from the first step, stirred for 1 hour using magnetic stirrer and then the excess solvent was removed by rota vapour. The resulting solid was dried in an oven at 120 °C for 16 h. These catalysts are activated in-situ in air prior to real catalytic tests.