







slight modification is frequently observed at the elevated temperatures. The composition analysis based on the XANES spectrum should be influenced by such slight modification of the XANES spectrum.

#### 4. Conclusions

In the present study, the chemical state conversion of the Ni species supported on TiO<sub>2</sub> has been investigated by *in situ* XAFS measurements. It is evaluated that the calcination temperature affects the chemical state of the supported Ni species. The NiO species was formed on TiO<sub>2</sub> in the Ni catalysts calcined at 300 °C and 600 °C, whereas the NiO species was incorporated into the TiO<sub>2</sub> lattice to form the NiTiO<sub>3</sub> species above 700 °C. The formed NiTiO<sub>3</sub> species was perfectly reduced to metallic Ni(0) by the reduction treatment under H<sub>2</sub> at 900 °C. However, the reduction temperature of NiTiO<sub>3</sub> was by 250 °C higher than that of NiO. This result indicates that the formation of the complex oxide increases the resistance for the reduction of the Ni(II) species and its aggregation.

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