Preparation and Characterization of Supported Silver Catalysts

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Keywords	Metal nanoparticles, Catalysts		
Technical Support Skills	・Preparation of metal nanoparticles ・Characterization of metal nanoparticles		

Research Contents

Precious metal nanoparticles such as a platinum and palladium are used as the environmental catalysts and catalysts for chemical synthesis. Silver is a relatively inexpensive metal and the abundance resource compared with the precious metal such as a platinum. Among the metal nanoparticles, silver has attracted extensive attention because of its wide range of application in catalysis. The supported silver catalysts have been prepared by liquid-phase processes such as precipitation from solution. However, the degree of silver particles supported on the support is low and non-uniform.

In this study, we tried to develop a new method in order to improve the surface structure on the catalysts. The particle characteristics of the prepared silver particles were also investigated. A new method using a thermal decomposition of silver-amine complex (Fig. 1) led to nano-sized silver particles and high dispersibility of silver particles on the titanium oxide support (Fig. 2).
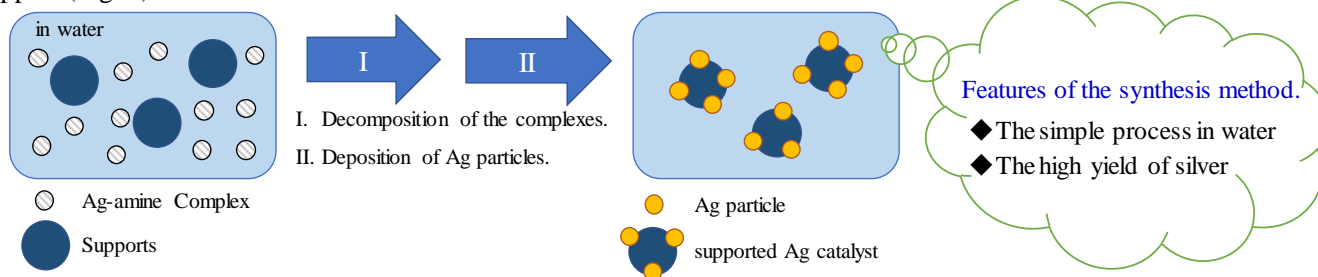

in water

I. Decomposition of the complexes.
II. Deposition of Ag particles.

○ Ag-amine Complex
● Supports

● Ag particle

supported Ag catalyst

Features of the synthesis method.
◆ The simple process in water
◆ The high yield of silver

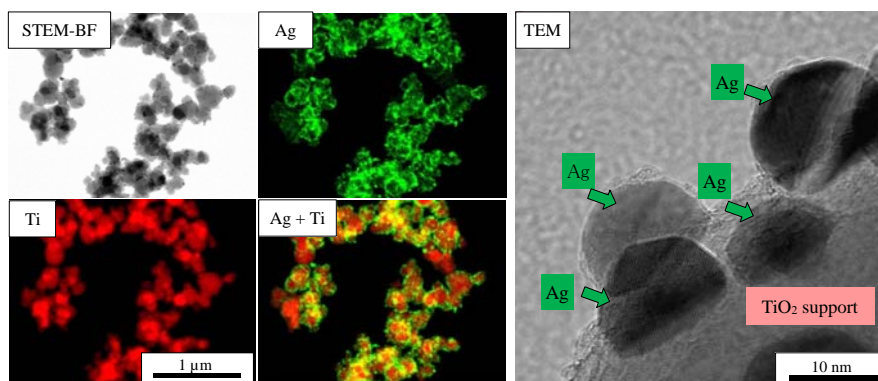Fig. 1 Thermal-decomposition reaction of Silver oxalate-amine complex.

Fig. 2 TEM and Elemental mapping images of the prepared Ag/TiO$_2$ catalyst.

Available Facilities and Equipment

Transmission Electron Microscope (JEOL, JEM-2100)	Nuclear Magnetic Resonance Spectrometer (JEOL, ECX400)
X-ray diffractometer (Rigaku, MiniFlexII)	IR Spectrometer (Shimadzu, IRAffinity-1)
X-ray Photoelectron Spectroscopy (Shimadzu, ESCA-3200)	UV-Vis Spectrometer (Shimadzu, UV-2550)

KOSEN SEEDS