

A High-performance Catalyst for Purification of Exhaust Gases

We have developed a highly porous platinum-alumina cryogel catalyst for exhaust gas purification with high activity and superior thermal stability. The reaction temperature of this catalyst is lower by about 100°C than that of conventional catalysts, and the thermal resistance has been improved to approximately 200°C. The advantage of this catalyst, together with the use of low cost aluminum hydroxide as the starting material, and the implementation of a low cost and simple process such as freeze-drying, will lead to the spread of its applications.

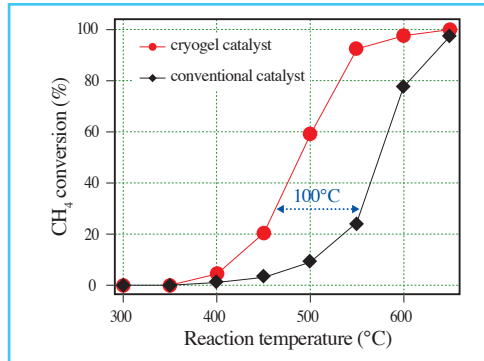


Figure 1: Methane combustion activity on platinum-alumina catalysts.

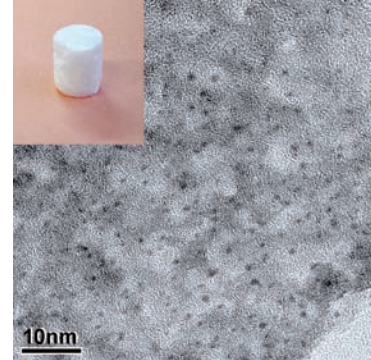


Figure 2: Platinum-alumina cryogel catalyst with 18 mm in diameter and 23 mm in height (upper), and nanoscaled platinum particles in the cryogel. The platinum content is 5wt%; black spots correspond to the platinum particles with ca. 1 nm diameter.

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High-efficiency Ultraviolet Light Emission from a Diamond Semiconductor

We have succeeded in fabricating a diamond *p-i-n* junction diode. The diode emits high-efficiency deep-ultraviolet (UV) light with the wavelength of shorter than 250 nm by current injection at room temperature. This deep-UV light emission has been realized by using the high density excitonic states in diamond, and can be observed even at 200°C. It is also found that the diode shows high internal quantum efficiency. These results indicate that even indirect transition semiconductors like diamond can emit high-efficiency deep-UV light.

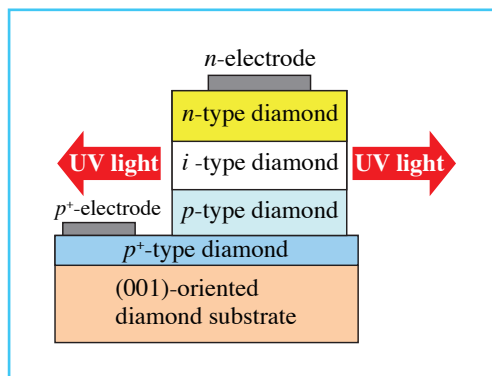


Figure 1: Schematic cross section of diamond *p-i-n* junction diode.

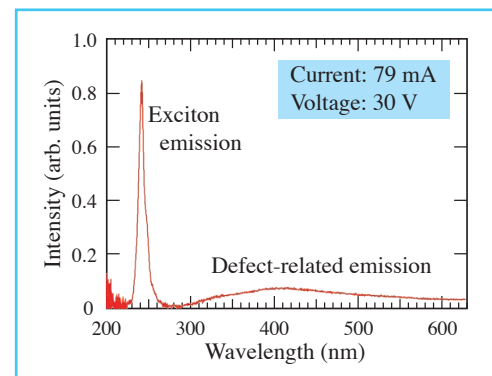


Figure 2: Current injected light emission spectrum at room temperature.

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