Faculty of Science and Technology
Tokushima University

Crystal Growth and Device Applications of Various Semiconductors

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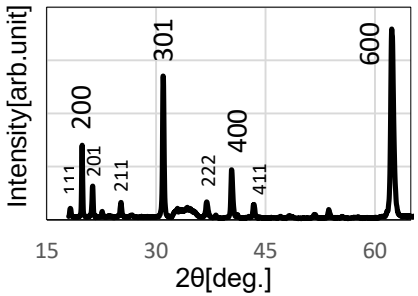

Fig.1 XRD pattern of $BaSi_2$ thin film

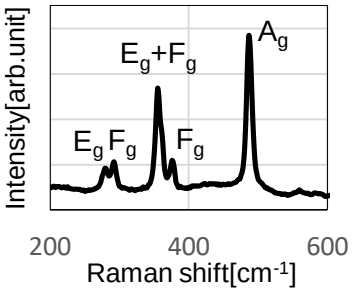

Fig.2 Raman spectrum of $BaSi_2$ thin film

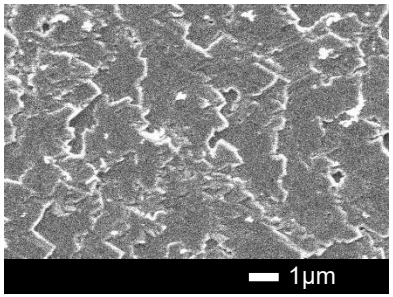

Fig.3 Surface SEM image of β-Ga_2O_3 thin film

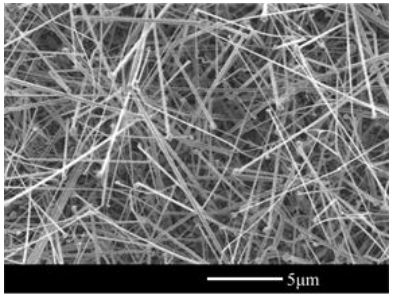

Fig.4 SEM image of β-Ga_2O_3 nanowires

We are studying on crystal growth and device applications of two kinds of semiconductors.

1. $BaSi_2$ has suitable properties for thin film solar cells, such as a bandgap, high absorption coefficients, and long minority carrier diffusion length. We grow $BaSi_2$ thin films on Si(100) substrates by conventional vacuum evaporation. Obtained films are a-plane oriented (Fig.1) and of high quality estimated by Raman scattering spectroscopy as shown in Fig.2. We are currently investigating the crystal quality, electrical and optical properties in detail for solar cell applications.

2. Ga_2O_3 is a widegap semiconductor and is expected as a material for high-power devices and various kinds of sensors. Among some polymorphs of Ga_2O_3 , we grow thin films and nanowires of most thermally stable β-phase by a direct synthesis method, which utilizes direct reaction of Ga and O_2 gas. Fig.3 shows a surface SEM image of a β-Ga_2O_3 thin film. The film has the step-terrace structure on the surface and is high quality with enough thickness. β-Ga_2O_3 nanowires with a diameter of about 100nm and a length of 10μm or longer can be grown on c-plane sapphire and glass substrates as shown in Fg.4.

Keywords: $BaSi_2$, Ga_2O_3, Nanowire

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