Physics and application of femtosecond laser irradiation

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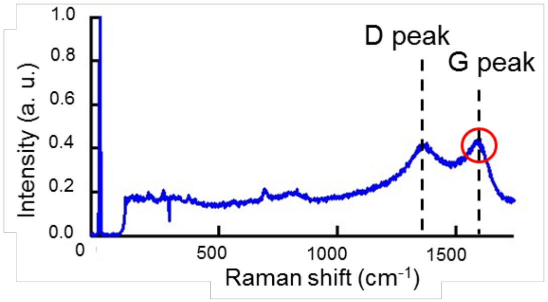

Fig.1 : Raman spectra with femtosecond laser irradiation on the interface between nickel and silicon carbide

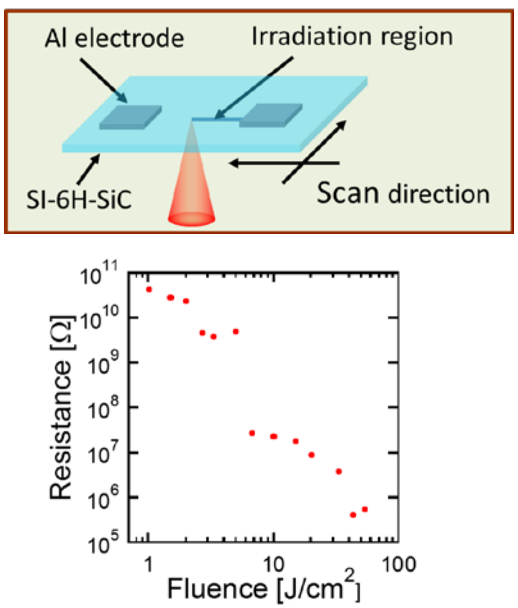

Fig.2 : Electrical conduction control by fs laser modification

The material modification due to the femtosecond laser irradiation on wide bandgap semiconductors has been studied. The spontaneous formation of nano-periodic structures and the amorphization due rapid heating and cooling process occurs after femtosecond laser irradiation. Wide bandgap semiconductors can be processed through the multi-photon process because of their transparency to femtosecond laser beam.

Fig. 1 shows Raman spectra after the femtosecond laser irradiation on the interface between silicon carbide and nickel. D and G bands due to carbon was observed, and this indicates that the carbon atom reached the nickel surface.

Fig. 2 shows the schematic of electrical conduction control by fs laser modification. The femtosecond laser beam is irradiated between two metal contacts on semiconductor. With increasing the irradiation fluence, the local electrical conductivity abruptly decreased at the threshold fluence.

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