VI-L Ultraviolet, Visible and Infrared Spectroscopy of Solids

Work of ultraviolet (UV), visible (VIS) and Infrared (IR) spectroscopy of solids have been proceeded. These are mainly performed using synchrotron radiation (beamlines BL7B and BL1B at UVSOR), owing to the wide wavelength continuity of synchrotron radiation with no structure.

VI-L-1 Performance of IR-VUV Normal Incidence Monochromator Beamline at UVSOR

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The beamline BL7B at the UVSOR facility for solid-state spectroscopy has been reconstructed and opening for users. This beamline consists of a 3 m normal incidence monochromator and covers from vacuum ultraviolet to infrared region. The optical configuration and the performance, such as photon number, purity and resolving power, have been investigated. The resolving power is over 8000 at around 180 nm and enough for solid-state spectroscopy over whole wavelength range. High purity and low stray of the monochromated light is almost fulfilled over whole range. The wavelength accuracy is less than 0.1 nm.

VI-L-2 Pseudogap Formation in the Intermetallic Compounds $(Fe_{1-x}V_x)_3Al$

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Optical conductivity data of the intermetallic compounds $(Fe_{1-x}V_x)_3Al$ ($0 \le x \le 0.33$) reveal that their density of states around the Fermi energy (E_F) is strongly reduced as x is increased. In particular, Fe_2VAl ($x = 0.33$) has a deep, well-developed pseudogap of 0.1–0.2 eV at E_F and a small density (-5×10^{20} cm^{-3}) of carriers, which is highly unusual for intermetallic compounds. It is shown that the pseudogap results from the band structures of Fe_2VAl, rather than from temperature-dependent correlation effects. Based on the present results, we propose a simple model that consistently explains both the semiconductorlike transport and the metallic photoemission results previously observed from Fe_2VAl.