Phase transition of MnF$_2$ by shock compression up to 33 GPa
TERUHISA HONGO, NOBUAKI KAWAI, KAZUTAKA NAKAMURA, KEN-ICHI KONDO, Materials and Structural Laboratory, Tokyo Institute of Technology, TOSHIYUKI ATOU, KUNIO YUBUTA, KEIJI KUSABA, Institute for Materials Research, Tohoku University, MASAE KIKUCHI, Kansei Fukushi Laboratory, Tohoku Fukushi University — Shock-induced phase transition of MnF$_2$ with the rutile structure was investigated using gun method in the pressure range between 3 and 33 GPa. Recovered samples were examined using X-ray diffraction method and transmission electron microscope (TEM) observation. The $\alpha$-PbO$_2$-type phase was observed in the recovered samples, and its yield had a maximum at about 10 GPa. Lamella patterns consisting of the rutile-phase and the $\alpha$-PbO$_2$-type phase intergrowth texture were observed in the TEM images of the sample shock-loaded to 9 GPa. The crystallographic relationship between both phases can be expressed as $(001)_{\alpha}$PbO$_2$ \parallel (-101)_{\text{rutile}}$ and $[110]_{\alpha}$PbO$_2$ \parallel $[111]_{\text{rutile}}$ by TEM observation. This directional relationship is different from that of TiO$_2$ previously reported, suggesting that possibility of a new mechanism for the phase transition from the rutile-type to the $\alpha$-PbO$_2$-type through fluorite-related structure under high pressure.