High-pressure phase transition of garnets in the system MgSiO3-Mg3Al2Si3O12

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High-pressure phase transitions of pyrope garnet (Mg3Al2Si3O12) were examined at 20-28 GPa and 1600-2000C using a 6-8 type multianvil apparatus. It was found that pyrope dissociated at 26.5-27 GPa and 1600-2000C into solid solutions of MgSiO3-rich perovskite and Al2O3-rich corundum with a slight positive slope boundary. Phase relations in the system MgSiO3-Al2O3 were also examined in detail at 20-28 GPa and 1600C and about 700C to clarify the transition of majorite garnet in the lower mantle. Wide two-phase fields of garnet + perovskite and that of ilmenite + garnet were established in the MgSiO3-Mg3Al2Si3O12 system.