## Origin of garnet crystals in volcanic rocks: an example from the Setouchi volcanic belt

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Calc-alkaline dacites and rhyolites from the Setouchi volcanic belt contain garnet crystals that are classified petrographically and chemically into two types: type-I and type-M. Type-M garnets are characterized by acicular sillimanite inclusions or dissolved textures, and are sometimes accompanied by xenolith fragments. They have a high MnO/CaO ratio and extensive compositional zoning with an increase in both Mg# and (FeO+MgO)/(CaO+MnO) toward the margin. These features are identical to those of garnets observed in metasediment xenoliths within the host rocks, suggesting a xenocrystic origin for the type-M garnets. In contrast, type-I garnets, accounting for 75 % of garnets we examined, are rich in CaO and show oscillatory zoning characterized by an antipathetic variation between FeO and MgO. TEM (Transmission Electron Microscope) analysis revealed the presence of minute glass inclusions in the type-I garnets, which is conclusive evidence that the garnet grew in the presence of a melt. The type-I garnets show no evidence to support an origin as a reaction product grown through a melting reaction in wall rocks or source materials. Therefore, type-I garnets are concluded to be magmatic in origin. A systematic relationship between the compositional oscillatory zoning and the distribution of minute glass inclusions is best explained by the interaction between garnet growth and diffusion in the melt.