

Silicate melt inclusions in quartz of the Tokuwa granitic rocks in Yamanashi Prefecture, central Japan.

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Primary silicate melt inclusions are found in the constituent minerals of granodiorite and granitic pegmatite of the Tokuwa plutonic body in Yamanashi Prefecture, central Japan. Silicate melt in inclusions had been crystallized with the temperature decrease of the host minerals and changed into the crystalline inclusions. A crystalline inclusion in quartz consists of several solid phases and a vapor phase. Probable liquid phase cannot be observed by the high relief of the vapor bubble. Solid phases show anisotropy under the microscope. Mineral compositions of the inclusions are similar to those of the host rock.

Crystalline phases in inclusions start to melt by heating in the furnace. In every step, the change of phases in inclusions was observed after quenching of the specimen. Finally crystalline phases homogenize into silicate melt and change into glass after cooling. The process of homogenization can be divided into three phenomena. They are (1) start of melting of solid phases, (2) disappearance of minerals except quartz, and (3) disappearance of quartz and vapor. (1) point shows minimum temperature of host silicate melt, (2) point the boundary curve between quartz and other minerals, and (3) point the liquidus of the host silicate melt. Phenomena (2) and (3) occur simultaneously in some inclusions. These inclusions trapped silicate melt in the period of crystallization of quartz and other minerals. Crystalline inclusions in granodiorite and granitic pegmatite homogenize by the disappearance of quartz. The fact indicates that the primary phase crystallized from the host silicate melt is quartz. And quartz crystallized from the inner wall of the inclusion because the volume of inclusion increased as increase of the heating temperature. It is also suggested that biotite started to crystallize at 1050-950 degrees Centigrade.

The crystalline inclusions distribute along the growth zoning plane of quartz in granitic pegmatite. Aqueous inclusions which include apparent fluid phase besides solid phase, distribute along the same plane. From the modes of occurrence of aqueous inclusions in the zone, it is suggested that the immiscible high saline fluid coexisted with silicate melt in the stage of pegmatite formation. Judging from the behavior of aqueous inclusion in heating experiment, granitic pegmatite might be quenched below 750 degrees Centigrade.

In the following stage below 400 degrees Centigrade, quartz was formed from the fluid with high salinity and high density on the quartz grains which were formed from the silicate melt. From the heating experiment of fluid inclusions, it is suggested that the fluid was not saturated with NaCl at first, and that the epitaxial growth of quartz from the fluid occurred between 360 and 340 degrees Centigrade.

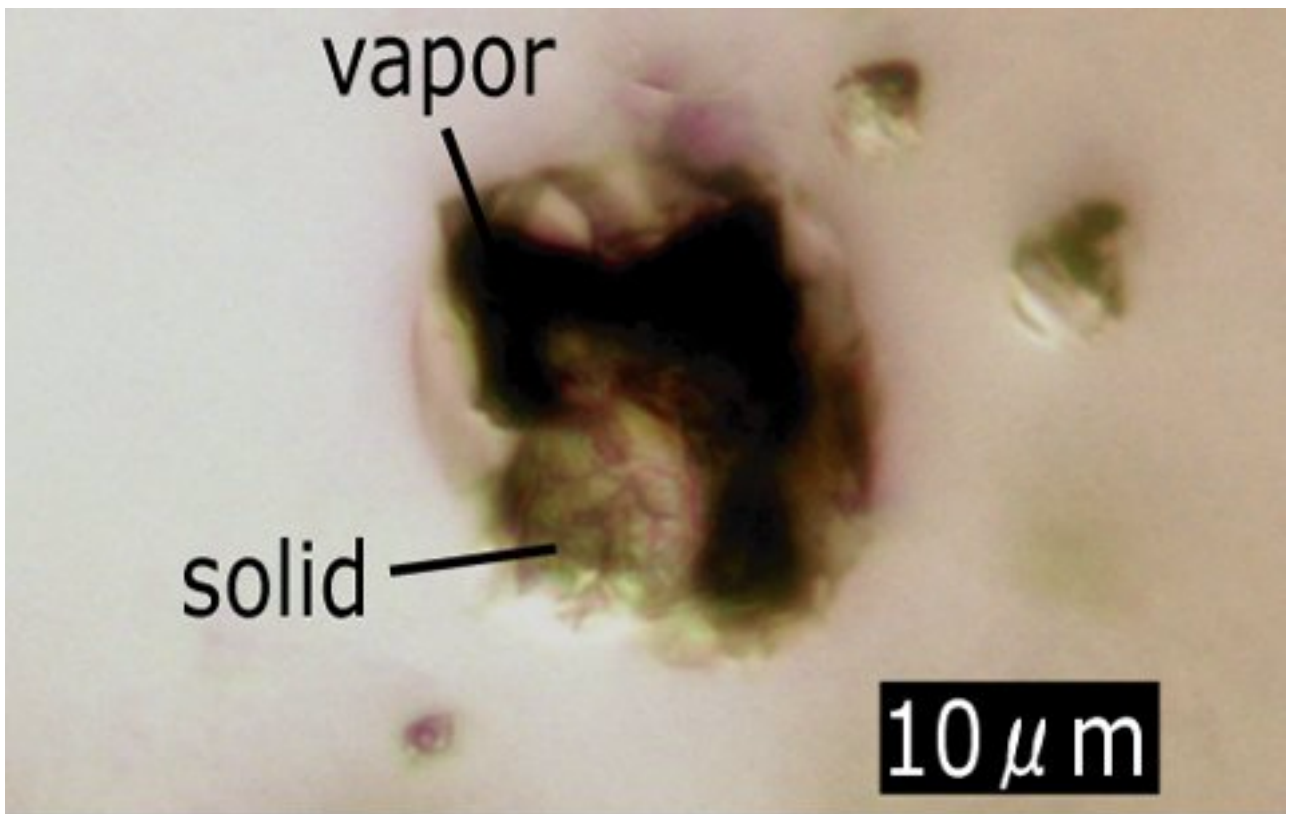


Fig.1 crystalline inclusions in quartz