

The kinetics of quartz-coesite high-pressure transformation using single crystal samples

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The kinetics of the quartz-coesite transformation was investigated at 4GPa and at 650, 750 and 850°C using single crystal samples. Microscopic observation shows that the transformation takes place only from the grain surface of quartz single crystal and then the grain grows into the interior. This suggests that the mechanism of transformation is incoherent grain-boundary nucleation and interface-controlled growth mechanism. We calculated the growth rate of the coesite rim and from the dependence of the growth rate on temperature, the activation energy is determined as about 79 kJ/mol. This value is smaller than that for powder samples (about 200 kJ/mol). This suggests that the different mechanism operates on transformation between the powder sample case and the single crystal case.