

### Synthesis Procedure

The starting glass was prepared from a mixture of oxides ( $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{MgO}$  and  $\text{Mn}_2\text{O}_3$ ) and carbonates ( $\text{CaCO}_3$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{K}_2\text{CO}_3$ ). The chemicals were first dried at  $120^\circ\text{C}$  for 48 hours, then weighed and ground in an agate mortar for the homogenization of the mixture. For the decarbonation the mixture was put in a platinum crucible inside a furnace at 1 bar and the temperature was increased to  $1100^\circ\text{C}$  in 15 hours and then kept constant for 2 hours. Then the glass inside the platinum crucible was melted in furnaces at about  $1600^\circ\text{C}$  for 2 hours, and finally quenched.

### FIGURES

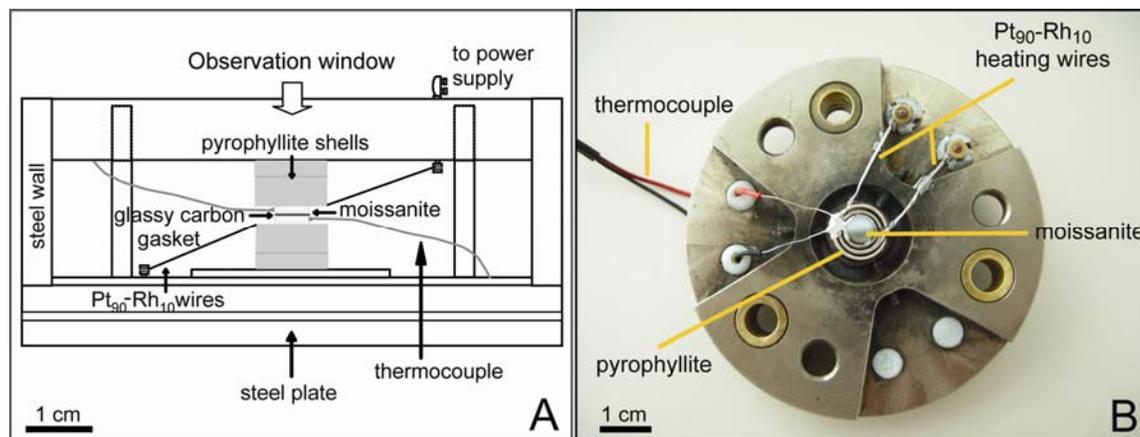


Figure DR1. A: Cross-section drawing of the moissanite cell. Two opposite heaters consist of steel plates in which sockets of baked pyrophyllite and moissanite anvils are placed. The pyrophyllite shells are wrapped by Pt<sub>90</sub>-Rh<sub>10</sub> heating wires with diameter of 0.3 mm. The sample chamber is located between the moissanite windows and surrounded by a glassy carbon gasket. B: Picture of the upper heater.

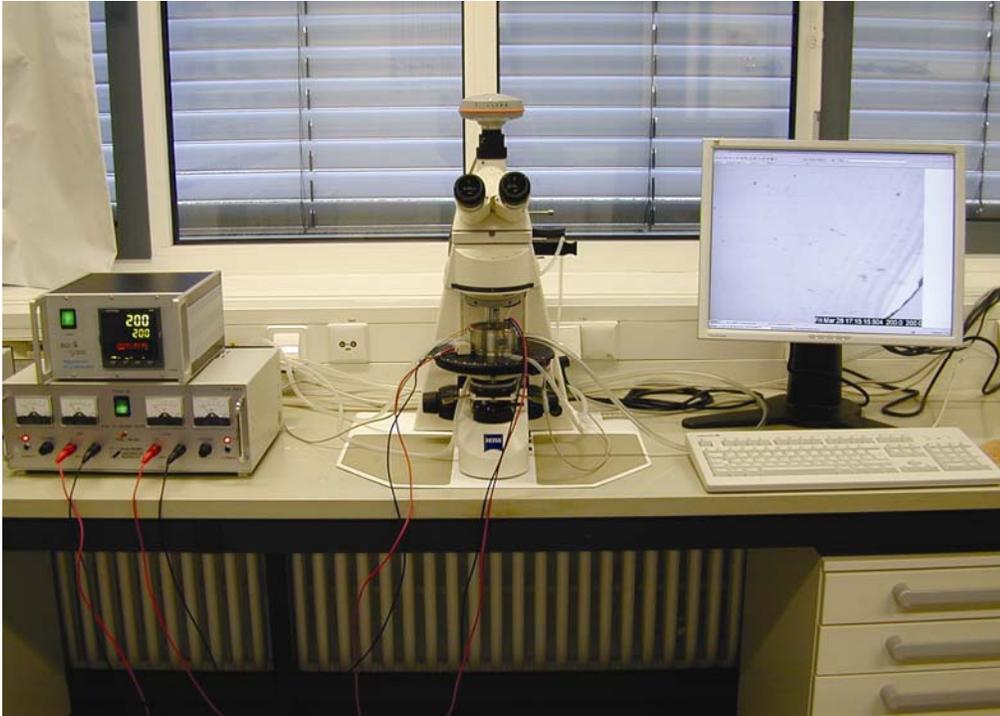


Figure DR2. The experimental setup consists of an optical microscope, a power supply coupled to an electronic device for temperature control, and a computer connected with a digital camera that records time-lapse pictures and movies. A steady influx of gaseous Ar-H<sub>2</sub> mixture is injected into the cell to prevent the oxidation of the glassy carbon gasket and heating wires. Outside cooling of the cell and of the microscope objective is achieved by a flow of compressed air.

## MOVIES

Movie DR1a–DR1b. Time-lapse movies of two replicate experiments conducted at the same run conditions showing the first 100-120 minutes of the crystallization process of a supercooled basaltic-andesitic liquid at 900 °C. The quantitative investigation reported in the text refers to Movie 1a. Image scale: the length of the observed sample area in both movies measures 665 μm.

Movie DR2. Detail of the movie 1a focusing on the crystal coalescence process shown in figure 4. Image scale: the length of the observed sample area measures ca. 130 μm.

## TABLES

Table DR1. Major elements composition of the starting glass determined by electron microprobe at the Bayerisches Geoinstitut (Bayreuth, Germany) using a JEOL JXA-8200.

Major element composition of the starting glass		
	average of 4 analyses	st.dev.
SiO <sub>2</sub>	55.05	0.21
Al <sub>2</sub> O <sub>3</sub>	17.96	0.05
MnO	5.81	0.01
MgO	4.33	0.06
CaO	8.85	0.07
Na <sub>2</sub> O	3.69	0.11
K <sub>2</sub> O	2.36	0.07
Total	98.04	

Table DR2. Crystal size distributions of the three steps shown in Fig. 2 calculated by using the program *CSDCorrections* (Higgins, 2000).

	Length mid interval	Pop Den	Min PD	Max PD
STEP 1	0.0957	11.22	10.8	11.48
	0.0604	13.6	13.4	13.73
	0.0381	16.07	16	16.13
	0.024	17.12	17	17.18
	0.0152	16.36	16.1	16.55
STEP 2	0.1517	8.87	7.64	9.4
	0.0957	12.92	12.7	13.06
	0.0604	15.01	14.9	15.09
	0.0381	16.73	16.6	16.78
	0.024	17.53	17.4	17.59
	0.0152	17.38	17.2	17.5
STEP 3	0.1517	10.88	10.5	11.11
	0.0957	13.67	13.5	13.77
	0.0604	15.21	15.1	15.28
	0.0381	15.9	15.8	15.99
	0.024	15.78	15.5	15.95
	0.0152	15.7	15.3	15.96