1. Whole-rock major and trace elemental analysis

Whole-rock major and trace element compositions were analyzed at Guangzhou Tuoyan Analytical Technology Co., Ltd, China. About 50 mg powdered sample is mixed with 0.6 ml HF and 3 ml HNO_3 in a PTFE bomb. The mixture was digested for 36 h at 185°C and then dried. 200 ng of Rh was added as an internal standard, and then 2 ml of HNO_3 and 4 ml of water were added. The bomb was again sealed and placed in an electric oven at 135 °C for about 5 h to dissolve the residue. After cooling, major elements (except SiO_2) were measured by ICP-OES (Agilent 720) with a dilute factor of 1000. The technique of Alkali fusion was used for sample digestion for SiO_2 measurement. A 0.05 g sample was dissolved with 0.25 g NaOH at 700 °C in Ag crucible for about 30 m after cooling. The content was then dissolved with hot water and acidified with 5 ml HCl to finally establish 250 ml for ICP-OES measurement. About 1g of the sample was used for LOI. The sample was weighed in a porcelain crucible and heated at 900 ℃ in a muffle furnace for about 1 h. The weighted difference before and after the ignite is the LOI. Trace elements were measured by a Jena Plasma Quant inductively coupled plasma mass spectrometry (ICP-MS) with a dilute factor of 3000. For major elements, GSR-3, GSD-4, GSD-6, OU-6, GSR-12, and GSR-13 are analyzed as standard and the accuracies of analyses are better than 5%. For trace elements, OU-6, BCR-1, GSD-11, GSD-12 are analyzed as standard, and the accuracies of analyses are better than 10%. The analytical results are listed in Table S1.