Silica-rich melt inclusions in upper mantle peridotite: Implications for subcontinental lithospheric evolution of eastern China

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Minerals of spinel- and garnet-facies peridotite xenoliths trapped in Cenozoic basalts from eastern China contains lots of melt inclusions. Analysis shows that the melt inclusions are rich in SiO₂ (60%-68%) and alkalis (K₂O+Na₂O=5%-11%, especially for K₂O) as well as volatiles, such as H₂O and CO₂ (2%-7%). The compositions of these melts, equal to dacites and andesites with few shoshonites, and belong to the high-K calcic alkali series rocks. Results show that these K-rich (generally K₂O>3%) intermediate-acidic silicate melt inclusions have characteristics of continent without a genetical link to host basalts and their phenocrystic minerals. High Al and Ca diopside in melt inclusion is the product of melt crystallization at high temperature and pressure, rather than the product of devitrification. Thus, these trapped melt inclusions represent melts of lithospheric mantle-crust interaction and imply that the continental lithospheric mantle beneath eastern China had undergone fragmentation and recreation processes during the Mesozoic and Cenozoic periods. This result undoubtly provides important implication for the evolution of sub-continental lithosphere beneath the eastern China. We suggest that these Si- and alkalis-rich melts are responsible for the mantle chemical heterogeneity underneath eastern China.

Localit															
у	Wangqing	Wa	Wangqing		Hannuoba			Qixia			Xinchang		Longhai		
Sample	WQ-50		WQ-69		HDW-14			QX17-1			ZN-50		LN-20		
Rock	Sp Harz.	Web	Websterite		Sp Lerz.			Sp Lerz.			Gt Lerz.			Sp Lerz.	
Mineral	Fo92	E	En82		Fo90			Fo90			Fo90			En90	
SiO ₂	66.23 68.15 60.	861.9	68.40	63.17	62.12	63.13	64.74	64.36	64.44	64.87	62.51	63.97	66.36	61.55	
TiO ₂	0.18 0.14 0.	1 0.53	0.39	0.47	0.49	0.60	0.36	0.21	0.47	0.11	0.46	0.27	0.49	0.40	
Cr ₂ O ₃	0.17 0.12 0.	1 0.07	0.00	0.19	0.33	0.11	0.00	0.05	0.06	0.00	0.16	0.04	0.15	0.02	
Al_2O_3	21.24 18.13 22.	022.64	20.63	22.74	22.08	22.20	23.94	23.58	23.16	19.26	20.64	20.17	20.00	20.83	
FeO	0.50 0.84 0.	2 1.47	0.15	0.80	0.60	0.77	0.82	0.68	0.71	0.83	0.46	0.58	0.81	1.31	
MnO	0.03 0.06 0.	0.00	6 0.78	0.00	0.00	0.00	0.06	0.00	0.00	0.08	0.03	0.03	0.00	0.18	
MgO	0.34 2.27 0.	6 2.00	6 0.17	0.72	0.76	2.27	0.17	0.16	0.02	2.90	0.68	1.56	1.69	3.86	
NiO	0.00 0.03 0.	0 na	na	na	na	na	0.17	0.01	0.00	0.21	0.00	0.11	0.00	0.00	
CaO	0.14 0.11 0.	9 1.65	0.00	1.36	1.95	1.62	0.49	0.52	0.23	0.97	0.75	0.64	1.87	1.25	
Na ₂ O	1.55 1.70 3.	0 3.40	5 4.79	3.05	2.66	2.43	2.30	2.32	2.05	1.84	2.29	1.77	0.88	1.92	
K_2O	4.26 4.10 7.2	2 3.90	5 4.79	4.66	4.04	2.50	3.14	3.22	2.97	3.10	4.14	3.90	2.38	3.69	
P_2O_5	na na na	na	na	0.18	0.24	0.15	0.68	0.30	0.25	na	0.56	0.29	na	na	
Total	94.7995.7595.	697.8	100.11	97.34	95.26	95.79	97.14	95.59	94.67	94.20	92.76	93.45	94.71	95.18	

 Table 1: Electron probe analyses (%) on glass melt inclusions.

Characteristics and zircon La-ICP MS U-Pb ages of the A-type intrusive rocks in Zongyang county, Anhui Province, East China

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La-ICP-MS U-Pb Ages Dating

The Zongyang area, located in northeast Tonling city of Anhui province, is a segment of the copper, iron, and gold metallogenic belt in the Middle and Low Reaches of the Yangtze River area. Many Mesozoic magmatic intrusions occur in this area, where the granodiorite and quartz diorite has been studied in detail [1], but the K-feldspar granite has not been focused. This study determined the zircon U-Pb ages of two main K-feldspar granites (Zongyang intrusion and Huangmeijian intrusion) as 124.7±2.1Ma and 125.4±1.7Ma by La-ICP MS.

Discussion

The whole rock analyses of major, trace and rare earth elements of the granites indicate that Zongyang and Huangmeijian intrusions belong to the typical A-tpye granite. They are formed in the last period of Yanshanian magmatic activity in the mineralization belt. Combined with geology and tectonic setting [2] we think that granites in Zongyang area support the idea that there existed an intensive crustal thinning event at 124-125Ma in the late period of the extension in the Middle and Lower Reaches of Yangtze River.

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[1] Xing *et al.* (1994) Acta Petrol Sinica **10**, 357-369. [2] Du *et al.* (2004) Acta Petrol Sinica **20**, 339-350.