Appendix: SAMPLING AND METHODS

Along with other minerals and alloys, the sample of this study was handpicked from a heavy mineral separate processed from 1500 kg of massive chromitite collected from orebody #31 of the Luobusa massif. Mineral separation was carried out at the Institute of Mineral Separation and Utilization in Zhengzhou, China, after careful cleaning of all equipment and first processing a 200-kg sample of granite as a blank.

Individual minerals were identified by optical techniques, followed by combination of scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), electron probe microanalysis (EPMA; including single spot analyses and elemental mapping).

The compositions of small grains were determined using an S-350N Hitachi SEM equipped with an Oxford INCA EDS at the Beijing Institute of Mining and Smelting and JEOL-ISM-5610 LV at Institute of Geology of the Chinese Academy of Geological Sciences, both at 20 kV.

The compositions of larger grains were determined using an EPMA-1600 electron microprobe operated at 15 kV and 0.01μA, with a sample current 0.009μA, using standards of quartz, kyanite, almandine garnet, plagioclase and microcline at the Geological University of Beijing.

Raman spectra were acquired using a Renishaw RM-2000 instrument at the Key Laboratory for Continental Dynamics, Institute of Geology of the Chinese Academy of Geological Sciences, Beijing, with a confocal microscope and a 50x lens objective, giving a 1 μm sample footprint at the specimen. The laser excitation was achieved using an argon ion laser providing radiation of wavelength 514.5 nm and spectra were recorded at 2 cm^{-1} resolution at several points on each measured grain in order to ensure representative signals from the heterogeneous area. Spectral accumulation times were of the order of 100 s. Specific minerals were identified in the Raman spectra based on comparison with Renishaw's Inorganic Materials and Minerals Database.

EBSD measurements: The crystallographic orientations of coesite were measured using a JEOL JSM-5610LV scanning electron microscope by electron backscatter diffraction (EBSD). The backscatter patterns were acquired at an accelerating voltage of 20 kV and a working distance of 20 mm. The photonic images were indexed by the CHANNEL5 software. The relative precision of crystal orientations measured from electron backscatter patterns is better than 1° (Krieger Lassen, 1996).

Table 2. Raman bands values occurred in spectra collected from kyanite and coesite

Standard Raman bands cm-1	950 900 298 Kyanite	966 753 589 Stish	?	521 Coes	470 392 369 Qtz	430 - 420 Rutile	355 Coes	?	271 Coes	231 Stish	176 Coes	? or artefact
74-3-2b				521	392.26			317.39	296.68	229.77		
74-3-2c				522					274		180.39	151.7
74-3-3c				524.40			333.30		256			
74-3-6b				522.89								
74-3-27a	946.64 890.88			521.3		438						
74-3-27b	890.88 298	729.99			484.66 392.26							
74-3-28a				521.3					269		177.2	150
74-3-30a				521.3								
74-3-31a				521.3			381.11		271.19		180	154.9
74-3-32a				506	486.25						175.6	
74-3-33a				524.48		417				218		
74-3-34a												
74-3-35a	945 895	962.57 725 583	570	521	484.66	428	357		271		177	
74-3-36a				522.89					274.38			153.71
74-3-37a	935.01 906.81											
74-3-38a				524								
74-3-40a				521								
74-3-50a			710.87							232		
74-3-51a			685.38	524.48			334.9					
74-3-52a	946.64 900		564	526	486.25		322			224.9	177	
74-3-53a				521.3								
74-3-54a				522.89								
74-3-55a				522.89					285.53		180.39	
74-3-56a	949.82 889.29			521.3	487.84						180.39	
74-3-69a	959.38 898.85 299.87			522.89							181.99	
74-3-70a	301.76		591.39?	522.89	486.25	425.72		323.76	263.23		177.2	
74-3-71a	953.01 898.85			522.89	486.25						178.79	
74-3-78a				521.3		427.31				201.1		
74-3-79a				521.3					277.56			
74-3-80a				521.3	467.13 369.96		346.06		271.19		175.61	
74-3-81a				522.89			354.03	315.8	271.19		177.2	
74-3-82a				522	486.25				299.87		178.79	
74-3-83				519.7			346.06		272.78		175.61	

74-3-84a				522.89		425.72	354.03		271.19	205.88?		
74-3-86a				521.3	487.84		357.27				178.79	
74-3-87a	892.48 491.03			524.48					279.16	212.25	178.79	
74-3-88a	957.79 900.44			522.89	486.25	428.9	358.81		272.78		178.79	
74-3-89a	957.79 900.44	698.12	624.85							232.96		
74-3-90a	967.35 903.03	734.76 715.65		522.89	483.06							
74-3-91a				521.3		427.3	357.21		271.19	207.47		151.71
74-3-92a				526.08	384.3?				272.78			
74-3-94a				521.3		430.39			272.47	207.47	174.01	
74-3-95a		796.89 694.94 610.51		522.89								
74-3-96a				524.48					280.75? 261.63		175.61	
74-3-97a	299.87			522.89					283.93	221.81	196.32	