[Supplementary material]

A jade parrot from the tomb of Fu Hao at Yinxu and Liao sacrifice of the Shang Dynasty

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Received: 11 December 2016; Accepted: 8 March 2017; Revised: 26 March 2017

Table S1. Heating experiments on nephrite (tremolite-actinolite)

Samples	Amount of iron/colour	Temperature (℃)	Holding time/heating equipment	Change of colour & structure	Experimenter
Actinolite with 3.73% water	6.56%; green	400~600 800 950	Not marked	400~500℃: colour changed from green to brown, 1.68% of water loss at 400℃ and Fe^{2+} started to oxidise; 600℃: from brown to dark brown, and oxidisation of Fe^{2+} completed; 800℃: 2.42% water loss; 950℃: 3.64%-3.73% water loss, and full phase transition of actinolite.	Belyankin & Donskaya (1939)
Taiwan nephrite cat's eye	3.0–3.5%; greenish-yellow	700 860	4 hours; electric kiln heating	700℃: colour changed from greenish yellow to yellow, structural water lost, and the mass decreased from 0.595g to 0.585g; 860℃: black and opaque, Fe^{2+} oxidised into Fe^{3+}, and the mass increased to 0.594g.	Tan *et al*. (1978: 35–36)
Smoothly polished New Zealand nephrite, 20 × 20 × 8mm	W301 green; W302 yellow to green; W106 olive green; W103 olive	300 650 1000	Air heating; electric kiln heating	300℃: colour started to change; 650℃: evident change in colour and increase in hardness; Above 650℃: moved to electric-kiln heating, the characteristics of different samples are as below: 1. Structure of the high-quality tremolite W301 was	Beck (1981)

				destroyed when it was heated to 1000℃. It had cracks and the colour changed to an opaque greyish-white. 2. The oxidised nephrite W302 grading from yellow to green turned reddish brown when it was heated to 650℃, grading darker towards the end that coincided with green in the unheated portion. 3. The softer olive-green semi-nephrite W106 had a typical dark outer skin when it was heated to 650℃; when heated to 1000℃, it was rusty colouring externally and opaque grey internally, with structured destroyed by crazing. 4. The olive oxidised outer skin of tremolite W103 continued to be oxidised and turned black to brown when heated to 650℃ for 1 hour, while the dark-green inner portion changed to brown or silvery whitish-green. Particularly, the cracks caused by heating were circular feathered.	
Liangzhu tremolite *Bi* (destroyed)	Fe/(Fe+Mg) =8.24; yellowish-green	650 950	650℃ for 1 hour; 950℃ for 5 hours; electric kiln	650℃ for 1 hour: brownish black; 950℃ for 5 hours: faded, whitened and the semi-transparency evidently decreased; during the heating process, Fe/(Fe+Mg) decreased gradually from	Wen (1994)

unearthed from Fanshan (M20:184)			heating	8.24 (unheated) to 7.25 (650℃) and 5.24 (950℃).	
Liangzhu actinolite jade *Bi* (destroyed) unearthed from Sidun, Changzhou (M3:59)	Iron amount unknown; dark green with greyish-white	400~500 1000	Electric kiln heating	400℃～500℃: surface turned brownish dark; 1000℃: surface turned reddish-brown.	Zheng (1996)
Hetian nephrite	Iron amount unknown; bluish-white	1100	0.5 hour; electric kiln heating	Full whitened or ivory coloured (white with little red) material, with glassy lustre, which could originate from new minerals or glass. Small black fractures were visible under magnification, tremolite had already transformed to diopside.	Tan *et al.* (1998)
Tremolite	Iron amount unknown ; cyan	700 1100	4 hours; electric kiln heating	700℃: slightly whitened on the surface, part of it looked like black patina, but phase transition did not happen; 1100℃; the outer skin was white, with many fractures, part of the tremolite had transformed to diopside.	Yu & Tan (1998)

Hetian nephrite	Low iron	500~ 1100 (increasing every 100℃)	24 hours at oxidising atmosphere; electric kiln heating	Once heated, the organic materials imbedded in crevices on the surface were carbonised and part of the sample turned olive black, while the majority of the sample turned lighter and became light yellowish-grey; 800℃: the sample was totally opaque, but the polished surface was not destroyed; above 800℃: the carbonised material gradually vaporised which led to the olive black area fading (olive black—dark yellowish brown (900℃)—light yellowish-brown (1000℃)—light orange (1100℃)); while majority area changed from light yellowish-grey to white (1100℃). At this stage, phase transition happened. The hardness slightly increased. The diopside came into being at 900℃. Above 900℃, the sample was very fragile and the hardness could not be measured. At 1000℃, the hydroxyl peaks totally disappeared.	Douglas (2001)
Tremolite	Iron amount unknown; green	500 650 850	1 hour; electric kiln heating	500℃: no visible change with the colour; 650℃: the colour whitened slightly, but the surface was still smooth; 850℃: the colour was darker, there were a few short and	Yu *et al.* (2006)

		1050		narrow fractures, but the sample was still tremolite at this stage. 1050℃: the appearance was reddish brown (predicted to be caused by the oxidisation of iron), and the colour was lighter; there were more cracks and their width and depth were larger; hydroxyl peaks totally disappeared, and the sample transformed to diopside.	
Tremolite Actinolite	Iron amount unknown; tremolite—white and bluish-white, actinolite—green	700 900	Electric kiln heating	Around 700℃: the white and bluish-white tremolite with low iron lost transparency and changed to light whitish grey in colour; around 900℃: turned light yellowish-white, and the colour was like ivory or chicken-bone white. After heating, actinolite with high-iron contents turned black first and then faded gradually. At around 700℃, they turned dark brown or dark yellowish-brown. No colour change happened with further heating.	Jin *et al.* (2007: 375–76)
Tremolite	Iron amount unknown; green	500~ 1200 (increasing every 100℃)	3 hours; electric kiln heating	500℃: no change with colour and glossiness; 600℃: the colour turned white slightly; 700℃: some dark spots and white areas appeared on the surface, and the glossiness decreased; 800℃: the white areas gradually became	Zhang (2011: 46–49)

				larger and larger. They were banded and spread over the surface; 900℃~1200℃: the colour turned whitish yellow totally and the sample phase transferred to Ca-Mg pyroxene. 1200℃: hydroxyl peaks totally disappeared and the phase transition completed.	

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