

Advancing Fei Cui Origin Authentication: A comparison of green Fei Cui from Myanmar, Guatemala, Italy and Russia

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In recent years, an increasing number of sources of fei cui, such as Guatemala, Italy and Russia, have entered the Chinese market, leading to a growing demand for precise origin determination of fei cui. Building upon our previous study (Liu *et al.*, 2024), this study progresses towards a more comprehensive understanding. In November 2024, author Liu conducted a geological field trip to the fei cui mines in Guatemala (Figure 1), collecting a new set of Guatemalan samples directly from the source. To expand the study's scope, green samples from Russia were also included (Figure 2).

Following the standard tests outlined in the fei cui standards (GAHK, 2016; GIT, 2022), which encompass RI, SG, and FTIR analyses, all samples (BU, n = 21; GU, n = 29; RU, n = 13; IT, n = 7) have been confirmed as fei cui, devoid of any resin or dye. Moreover, the FTIR results, consistent with

the literature (Abduriyim *et al.*, 2017; Miura *et al.*, 2019), support the classification of the Russian samples as jadeite jade. In alignment with our previous study, the recent batch of Guatemalan samples collected between 2023 and 2025 also exhibits jadeite dominance, while the Italian samples are characterised by chrome-omphacite dominance (Liu *et al.*, 2024). Compared with other localities, Russian fei cui relatively coarse granular and loose texture, and contains phlogopite and molybdenite (Figure 3).



Figure 2. The samples of green fei cui from Russia (left, RU-01 1.03 ct), Guatemala (centre, GU-G31 0.83 ct), and Myanmar (right, BU-41 0.78 ct) analysed in this study



Figure 1. Outcrop of jadeitite and omphacitite (white area on the left) with intrusive dykes of albitite and amphibolite in serpentinite mélangé in a new mining site on the north-eastern side of the Motagua fault zone in Guatemala. Photo © S.I Liu

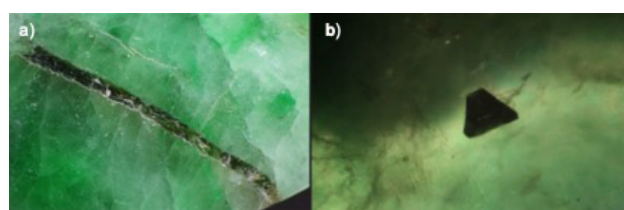


Figure 3. (a) Phlogopite and (b) molybdenite inclusions found in Russian fei cui

LA-ICP-MS were used to analyse the characteristic trace element profile of fei cui from different origins. The 3D-PCA score plot of LA-ICP-MS (Figure 4a) indicates a distinct separation of Italy from other regions, with slight overlap

observed among Myanmar, Guatemala, and Russia. Among the four localities, Russian *fei cui* has the highest Ga, Zn, Li, and Fe content, while Italy has the highest Cr content (Figure 4b) due to its chrome-omphacite-dominated nature.

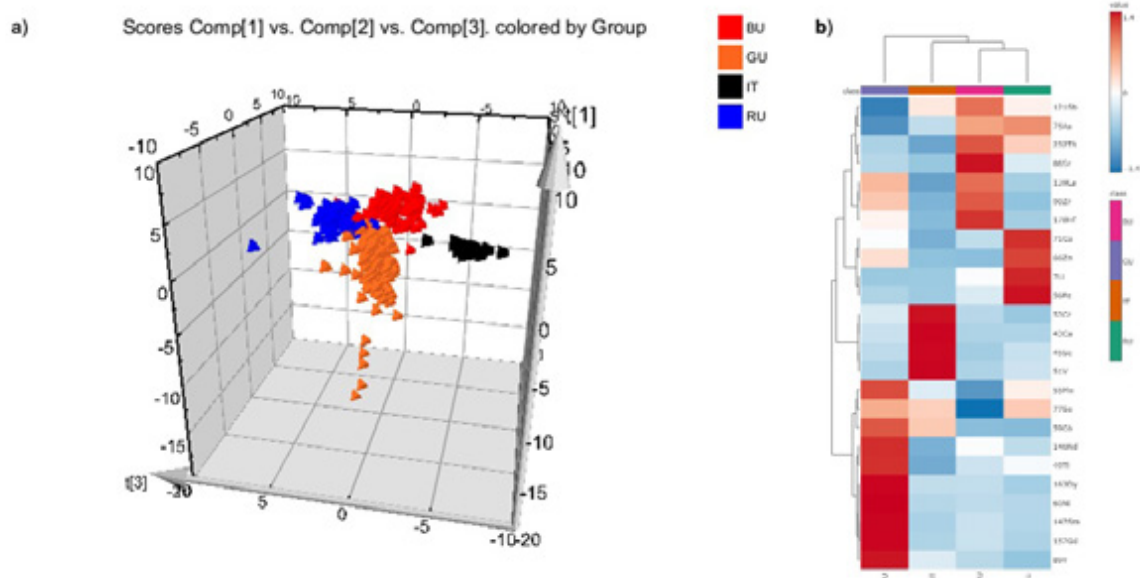


Figure 4. (a) 3D-PCA score plots of LA-ICP-MS data of green fei cui from Myanmar (BU), Guatemala (GU), Italy (IT) and Russia (RU); (b) Heatmap of LA-ICP-MS data.

References:

- Liu, S.I, Man, K.Y., Seneewong-Na-Ayutthaya, M., Jakkawanvibul, C., Lee, A. T.-Y. (2024). Geographic Origin Determination of High-quality Green Jadeite-Omphacite Jade (Fei Cui) from Myanmar, Guatemala and Italy Using Statistical Processing Coupled with Spectroscopic and Chemical Analysis. *The Journal of Gemmology*, 39(2), 124-145
- The Gemmological Association of Hong Kong (GAHK). (2016). Standard Methods for Testing Fei Cui for Hong Kong (HKSM/FCT-2016), GAHK. http://www.gahk.org/attachment/fc_std_eng.pdf
- The Gem and Jewelry Institute of Thailand (GIT). (2022). The Gem and Jewelry Institute of Thailand Standard-Testing of jade and Fei Cui (GIT 1013.1-2564), GIT.
- Abduriyim, A., Saruwatari, K. & Katsurada, Y. (2017). Japanese jadeite: History, characteristics, and comparison

- with other sources. *Gems & Gemology*, 53(1), 48–67
- Miura, M., Arai, S., Ishimaru, S., & Shmelev V. (2019). Ornamental Jadeites from the Levoketchpel Deposit in the Polar Urals of Russia. *Gems & Gemology*, 55(2), 278–281
- Franz, L., Sun, T. T., Hänni, H. A., De Capitani, C., Thanasuthipitak, T., Atichat, W. (2014). A comparative study of jadeite, omphacite and kosmochlor jades from Myanmar, and suggestions for a practical nomenclature. *Journal of Gemmology*, 34(3), 210–229.
- Wang, L., Zhang, H., Liu, J., Wang, L., Ouyang, Q., Liu, D. & Liu, W. (2022). Mineral component and genesis of high-grade green jadeite jade from Guatemala. *Journal of Gems & Gemmology*, 25(5), 11–30.
- Zhang, Y. & Shi, G. (2022). Origin of blue-water jadeite jades from Myanmar and Guatemala: Differentiation by non-destructive spectroscopic techniques. *Crystals*, 12(10), 1448,