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中國新疆和田玉“子料”

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摘 要

在世界軟玉礦產資源中，中國新疆軟玉（和田玉）礦床的成因、品種、品質、衍生文化等諸方面均具獨特地位和典型意義。然而，作為世界上唯一得到確認的河流次生礦床所產的和田玉礦石（俗稱“子料”），儘管其商業價值被市場充分利用，但對其材料的物理化學性質、岩石礦物特徵、地質成因等學術研究甚少。文章作者和他們的研究團隊在新疆和田地區野外實地考察了和田玉次生礦床的分佈特徵，對多個採挖現場進行了詳細記錄和採樣，勘察了礦區地質環境，收集子料樣品、冰磧礫石、冰川水、沉積土壤、階地礫石等標本。通過對中國新疆玉龍喀什河和喀拉喀什河流域產出的數千塊和田玉子料樣品，使用超景深三維顯微系統對其表面裂隙特徵、表面凹坑及“毛孔”特徵、表面次生礦物以及他們之間的關係進行了定量觀察、統計和解析。

研究結果表明和田玉子料表面的微細結構記錄了與其形成有關的地質過程和作用，其表面的裂隙可分為兩類：一類是由冰川刨蝕、挖蝕作用所形成的裂隙；一類是在河流搬運過程中由礫石相互撞擊、磨蝕所形成的裂隙。運用高倍率顯微系統，對和田玉子料表面的凹坑形態、分佈特徵進行了統計分析；使用高倍率原位即時觀察實驗證實了部分和田玉表面微細凹坑和“毛孔”的形成與和田玉內部化學成分不均勻性有關，如碳酸鹽等易腐蝕成分發生選擇性化學反應導致表面出現凹坑。最後，較為系統的分析探討了和田玉子料表面裂隙、凹坑與粗糙度和表面皮色的關係。

Zi-liao of the Hetian Yu (Nephrite Pebbles) from Xinjiang China

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ABSTRACTS

In the global nephrite deposit resources, the nephrites from Xinjiang China, also called Hetian Yu, has a very unique and typical importance in the areas of the mineral origin, variety, quality and the derivative culture. Nevertheless, as the only one mineral acknowledged as the secondary deposit (river) of Hetian Yu, the nephrite pebbles, commercially called as Zi-liao, its physical and chemical properties, mineralogical characteristics and geographical origin have not yet been systematically researched, even though Zi-liao’s commercial value has been deeply exploited. The writers and their team made a survey in the fields of the secondary deposit, took samples of the Zi-liao pebbles, glacial gravels, glacial water, sedimentary soils and the terrace gravels. A 3D-microscope with deep focus was introduced in this research to observe and analyze the fractures, pits and the secondary minerals in/on the surface.

The research revealed that the micro-structure in the surface of the Zi-liao recorded the geographical process they had experienced during their formation. The surface-fractures can identified as two categories: one is formed by the glacial abrasion or plucking; the other on is formed during the clashing and abrasion between the gravels. The shaping and distributing of the pits on the surface was researched and statistically analyzed and the experiments also proved that the micro-pits and “pores” were contributed to the selective reaction and inhomogeneous of the chemical contents in the nephrite pebbles. The article concluded the relationship between the fractures, pits, roughness and the color on/in the surface of the Zi-liao (nephrite pebbles)