Researchers reveal preservation mechanism of Chuaria fossils in Lantian biota

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China Anhui Wannan, large tracts of agricultural land. Credit: Pixabay

A research group led by Dr. Wang Wei from the Nanjing Institute of Geology and Palaeontology of the Chinese Academy of Sciences (NIGPAS) employed light microscopy, field emission scanning electron

microscopy, energy-dispersive spectroscopy, and Raman spectroscopy techniques to reveal the preservation mechanism of pyritized Chuaria from the Lantian biota.

The study was published in *Precambrian Research* on Dec. 31.

The Lantian biota (approximately 600 Ma) was discovered from the Ediacaran basinal-facies deposition of the Lantian Formation near Lantian Town of the Anhui Province, South China. The Chuaria fossils, usually with spheroidal or disk-like shapes, are the most common macrofossils in the Lantian biota.

Although great majority of the Lantian Chuaria fossils are preserved as carbonaceous compressions, Chuaria has been reported to be commonly preserved as pyritization enveloped by aluminosilicate minerals in the upper Member II of the Lantian Formation.

The outer minerals that envelope the pyrite layer have been assigned to quartz or aluminosilicate clay minerals. However, their exact mineral compositions as well as whether these minerals have contributed to the exceptional preservation of Ediacaran Lantian Chuaria remain unclear.

"Our taphonomic experiments show that Chuaria fossil pyritization occurred at early fossilization process and had contributed to the soft-tissue preservation," said Dr. Wang. "The pyritization process was probably divided into at least two stages, which were characterized by distinct pyrite crystal morphologies."

The pyritized Chuaria fossils were enveloped by platy minerals, a complex mixture of quartz and magnesium-rich aluminosilicates. Integrated mineral and structural pattern analyses showed that these quartz and clay minerals were both secondary overgrowth on Chuaria internal mold, which probably formed as a diagenetic product concurrent

with carbonate dissolution in the Lantian black shales.

Their formation was probably regulated by local micro-environment near the Chuaria bodies. These enveloped minerals might facilitate preservation and identification of Chuaria fossils, but they were probably not involved in the initial fossilization process as the early diagenetic pyritization had done.

More information: Wei Wang et al, Taphonomic study of Chuaria fossils from the Ediacaran Lantian biota of South China, *Precambrian Research* (2021). DOI: 10.1016/j.precamres.2021.106529

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