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Framboidal Pyrite Formation and Its Significance in the Southwestern Ordos Basin, China

Chao Zhang¹, Xiaobin Wu¹, Baojin Zhao^{1, 2, 3}

1. School of Geoscience and Technology, Southwest Petroleum University, Chengdu, China, 2. Department of Environmental Sciences, University of South Africa, Florida, South Africa, 3. Overseas Expertise Center for Deep Marine Shale Gas Efficient Development Innovation (111Center), Southwest Petroleum University, Chengdu, China

Enrichment of framboidal pyrite was identified in the Yanchang Formation's Section 7 (Chang 7) in the Triassic of the southwestern Ordos Basin, China, which is the second largest in oil and gas reserve and production. The basin is located in the south margin of the North China Craton and bounded by a number of faulted blocks and fold belts in its margins, which basement is a metamorphic system of the Archaean and the lower Proterozoic, while the basin itself consists of from the Precambrian to Tertiary systems, with a total thickness of 5,000 to 10,000 m and 370,000 km² crossing Shaanxi, Gansu and Shanxi Provinces. This study was focused on the bottom portion of Chang 7, being characterized by both higher Gamma Ray American Petroleum Institute (GR API) and Self Potential milli Volt (SP mV). The methods used include SEM/EDS, together with XRD and ICP-OES etc. The results show that most of the pyrite aggregates are typically spherical framboids with almost unique number of individual cuboctahedron crystals of pyrite with almost perfect crystallography whether or not bigger or smaller in size. The framboidal pyrite aggregates are largely elongated and worm- or green bean- like shapes except for minor individual pyrite framboids, largely along the bedding of the sediments. There is no clear link with hydrothermal and tectonic activities, and directional growth feature. A certain membrane structure can be seen on the outer shells and nets of pyrite framboids, indicated by predominant organic carbon, detected by SEM/EDS. We conclude that enrichment of framboidal pyrite is strongly connected with life, specifically microorganisms and organic matters, which is a typical indicator of the oil source rocks. Enrichment of pyrite may generate acid mine drainage and cause environmental damage in exploitation of oil, gas and shale gas.