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Biogenic syngenetic pyrite from tuffaceous sedimentary RF3–V rocks

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Biogenic framboidal pyrite was found in intraformational tuffaceous sedimentary gravelites, within basic volcanites (RF3–V) in Subpolar Urals (Sablya Ridge). Pyrite grains (Fe 44.07–44,33, S 50.22–53.31 wt. %) are composed of ball-like microconcretions, sometimes intergrown with crystals of pentagondodecahedron and cubic habit. The microconcretions (20 to 40 mcm) are roundish and composed of microcrystals, which end faces form spherical surface. The nuclei of the microconcretions are represented by frambohedrons 4-5 mcm in size, which are pyritized cells of sulphate-reducing colonial coccoid microfossils. The formation of the frambohedrons occurred synchronously to sedimentation in stagnant reducing environment at interaction of biogenic hydrogen sulphide with water-dissolved iron. The biogenic hydrogen sulphide is reduced by microorganisms in the conditions of free and unrestricted access of dissolved sulphate ions sourced from sulphur of fumarole gases. Iron came from washed-out basic volcanites. The growth of outer radial parts of microconcretions occurred during compaction of sediments in diagenetic stage. The quantity of dissolved sulphate and iron during pyrite formation exceeded possibilitites of bacterial “starters” which resulted in the formation of pyrites of other morphological varieties. This is confirmed by the accretion of concentric rays of the concretions and cubic microcrystals of pyrite in the aggregate grains. The formation of tuffaceous sediments occurred during temporary decrease of volcanic activity in a continuous linear water flow with stagnant areas composed of water-displaced pebbles from underlying metaterrigenous rocks (RF 1–2), which were exposed beyond the development area of volcanic strata, unchanged clasts of recent and synchronously formed basic and medium volcanites with participation of air-driven ashes and influence of volcanic gases in the presence of sulphate-reducing bacteria.
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