Authigenic pyrite formation by geomicrobiological laboratory studies and its application in south east of Japan sea-sediments

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Abstract: Bacterial and Archeae colonies in marine sediment play important role in methane production and precipitation of authigenic minerals such as pyrite in the Nankai sedimentary basin in south east of Japan. Authigenic pyrite precipitates in anaerobic condition, without light and in suitable medium by sulfate-reducing bacteria (SRB). These bacteria are mesophile and heterotroph. pH and Eh of medium play important role in growth of these microorganisms and precipitation of authigenic pyrite in laboratory condition while chemical composition of materials in medium and organic material in Nankai sediments have important role as chemical factors in precipitation of pyrite too. Organic matrix (extracellular polymeric substances [EPS]) that covers bacterial cells also plays important role in electron arrival (resulted by sulfate reduction) into the cell of SRBs. In fact, the Fe³⁺ in the pore water of sediments react with EPS. The iron in the EPS may serve as an electron shuttle or conductor for conveying electrons from the oxidative half-reaction of metal sulfides to the electron transport system in the plasma membrane. Organic matrix forms biofilm in sediments. The results indicates formation of authigenic pyrite by Geobacteria Sulphate-Reducer in biofilms within the sediments of the Nankai basin.

Keywords: Authigenic pyrite, geobacteria, sulphate-reduction, biofilm, Nankai Basin.