

EPR and SEM study of organo-mineral associations in lower permian evaporite dolomites

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Abstract

Lower Permian (280 to 300 Ma) evaporite dolomite rocks from the western part of the East European platform were studied by optical microscopy, scanning electron microscopy with microprobe analysis, and X-band electron paramagnetic resonance (EPR). Microscopic studies showed that many dolomite grains consist of an aggregation of submicron dolomite crystals (0.2-2 μm) as a spheroidal nucleus which is overgrown by a larger dolomite rhombohedron (5-20 μm). The EPR spectrum of a raw rock sample is mainly determined by thermally unstable radiation centers and Mn 2+ ions substituted at Ca and Mg sites in the dolomite crystal structure. The presence of dispersed organic matter at low concentrations was revealed from the backscattered electron images with a microprobe analysis of carbon-enriched areas on cleaved surfaces and the registration of the carbon-centered free organic radical signal in EPR spectra of heat-treated samples. A model of two successive growing stages for dolomite grains is suggested: the dolomite (or dolomite precursor) nucleation and aggregation in the colloidal stage to form suspended organo-mineral particles before the gravitational settling, and early diagenetic overgrowth at lower temperature and more stable environment of the marine bottom to form a dolomite rhombohedron. The observation of both growing stages for dolomite grains indicates that there was no recrystallization in the later stages of the rock history. © Springer-Verlag 2009.

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