Evidence of microbial and chemical signatures in Middle Jurassic ferruginous stromatolites from the Southern Carpathians, Romania

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Ferruginous stromatolites are commonly regarded to have formed in association with microaerophilic Fe-oxidizing micro-organisms that can preserve morphological and geochemical signatures of the former microbial mats activity. Two main categories of ferruginous stromatolites have been distinguished: (1) Ferruginous microstromatolites (Fems) associated with the complex hardground surfaces and (2) Domical ferruginous stromatolites (DFeS) developed, within *Ammonitico Rosso* – type succession. Morphological and geochemical data suggest a possible microbial activity involved in the formation of these stromatolites. Scanning electron microscope examination revealed that these ferruginous stromatolites were formed by the activity of microbial mats dominated by the filamentous structures. The iron isotope values provide that these stromatolites yield a large range of δ^{56}Fe values, from (–)0.75 to (+)0.66‰. The positive values are predominant, fact indicating the prevalence of partial ferrous iron oxidation formed in the early depositional process. The rare-earth elements indicate that Ce anomalies display moderate to small negative values for the Fems, indicating weakly oxygenated waters compared with the DFeS samples that show moderate positive Ce anomalies suggesting deeper water anoxic - suboxic environments. Besides, positive Eu anomalies indicate the involvement of a diffuse hydrothermal input on the seawater during the Middle Jurassic ferruginous stromatolites. The purpose of this paper is to report new morphological and geochemical data interpreted as biosignatures involved in the genesis of Middle Jurassic ferruginous stromatolites.