Formation mechanism of Cambrian oncoids: Evidences from the Miaolingian Zhangxia Formation, North China Platform

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Oncoid is the type of microbial carbonate that exhibits characteristics of coated grains with a size relatively larger than ooids. It also depicts successive lamination formed through microbially-mediated calcium carbonate precipitation similar to stromatolites. This study is intended to investigate the formation mechanism of Cambrian oncoids from the Miaolingian Zhangxia Formation exposed in the Shanxi province of north China. Currently, a bed of oncoidal limestone in the uppermost part of the fourth-order subsequence in the Zhangxia Formation is considered for petrographic investigation. The oncolite, graduating from oolitic limestone, exhibits the fabric of both stromatolites (laminated) and ooids (coated grains) on a large scale. On the other hand, at a smaller scale, it shows plentiful twisted and non-twisted calcified filamentous cyanobacteria in the cortexes and matrix of the oncolite. These features of the oncolite offer tangible signatures of the direct or indirect role of filamentous cyanobacteria in the development of these oncoids. The oncoids of the Miaolingian Zhangxia Formation provide a classic instance of organo-mineralization, involving a complicated calcification process of extracellular polymeric substances (EPS) in the cyanobacteria-dominated microbial mats.