

# **Lamellation Fractures and Their Influence on Shale Gas Enrichment in Marine Shale in Southeast of Sichuan Basin, China**

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## **ABSTRACT**

Marine shale gas is widely distributed in Southeast of Sichuan Basin, where is the only area for commercial development in China. The enrichment and production of marine shale gas are controlled by various factors among which the fractures are the most significant. By the observation of cores and outcrops, we found two types of fractures. One is tectonic fractures and the other is diagenetic fractures. Tectonic fractures can be further divided into intraformational open fractures, transformational shear fractures and bed-parallel shear fractures, whereas diagenetic fractures can be divided into lamellation fractures and shrinkage fractures. In the above fractures, the lamellation fractures are one type of fractures which made the most tremendous contribution to the reservoir space of marine shale gas. Lamellation fractures generate due to the weak and strong alternation of hydrodynamic force, which lead to the vertical heterogeneity of shale and subsequent fractures due to differential compaction in diagenetic process. Lamellation fractures, whose filling degree is low and aperture is under a millimeter, are parallel to the bedding plane. The SEM results show that the aperture of lamellation fractures is about 12 $\mu\text{m}$ , and as little as 0.38 $\mu\text{m}$ . Lamellation fractures can be divided into 4 types by the fracture aperture. More than 100 $\mu\text{m}$  is large lamellation fractures, 10-100 $\mu\text{m}$  is medium-sized lamellation fractures, 1-10 $\mu\text{m}$  is small fractures, 1 $\mu\text{m}$  below is miniature fractures. Lamellation fractures, which provide free gas with good reservoir space, widely distributed in marine shale in Southeast of Sichuan Basin. We found the porosity of lamellation fractures is 1.17% through the MAPS (a new experiment of SINOPEC) test. Disconnected organic matter pores can be communicated by lamellation fractures and form an effective pore-fracture system to further promote the enrichment of shale gas. The MAPS test shows that there is 32.8% of lamellation fractures and 67.2% of organic matter pores in this pore-fracture system. We conclude that the enrichment of shale gas in marine shale in southeast of Sichuan Basin is controlled by the lamellation fractures which provide space to store shale gas and communicate organic matter pores to formed pore-fracture system.