

## Pressure effects on the abiotic polymerization of glycine

# Shohei Ohara[1]; Takeshi Kakegawa[1]; Hiromoto Nakazawa[2]

[1] IMPE., Tohoku Univ.; [2] NIMS

[http://www.ganko.tohoku.ac.jp/GankoJP/HomePage\(JP\).html](http://www.ganko.tohoku.ac.jp/GankoJP/HomePage(JP).html)

Polymerization experiments were performed using dry glycine under various pressures of 5-100 MPa at 150°C for 1-32 days. The series of experiments was carried out under the assumption that the pore space of deep sediments was adequate for dehydration polymerization of pre-biotic molecules. The products show various colors ranging from dark brown to light yellow, depending on the pressure. Visible and infrared absorption spectroscopy reveal that the coloring is the result of formation of melanoidins at lower pressures. High-performance liquid chromatography and mass spectrometry analyses of the products show that: (1) glycine in all the experimental runs oligomerizes from 2-mer to 10-mer; (2) the yields are dependent on pressure up to 25 MPa and decrease slightly thereafter; and (3) polymerization progressed for the first 8 days, while the amounts of oligomers remained constant for longer-duration runs of up to 32 days. These results suggest that pressure inhibits the decomposition of amino acids and encourages polymerization in the absence of a catalyst. Our results further imply that abiotic polymerization could have occurred during diagenesis in deep sediments rather than in oceans.