

Microscale processes of thermal coagulation of polypeptides during pneumatic impact

IVANOV A.A.¹, SEVASTYANOV V.S.¹, VOROPAEV S.A.¹, DOLGONOSOV A.A.¹

¹ Vernadsky Institute of Geochemistry and Analytical Chemistry of Russian Academy of Sciences, Moscow 119991, Russia (aiva@geokhi.ru, vsev@geokhi.ru, voropaev@geokhi.ru, lex.dolgo@gmail.com)

The abrasive shores of the World Ocean line are dotted with holes of various sizes formed by the surf waves. When a wave strikes a closed cavity, an air impact occurs. Water, working as a piston, compresses the air, which at the same time is heated. Calculations have shown that the instantaneous air temperature during a pneumatic impact can reach hundreds of degrees. If cavities are filled with water partially, then the heated air aerates the water under the pressure with small bubbles. Our laboratory experiments showed that if an organic broth with an aqueous-polypeptide mixture is placed in a closed cavity, a polypeptide membrane forms on the boundary of hot air bubbles, forming microspheres. This phenomenon may be of interest to the problem of the origin of life, revealing a possible mechanism for the formation of the cell membrane of the first probionts. Subsequent experiments have shown that under the same conditions, polycondensation of amino acids and the formation of monosaccharides from formaldehyde can occur.