



High speed impact experiment for studying of survivability of microorganisms and synthesis of complex organic molecules under low temperature

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In our experiments we used the special small size accelerator — "high speed" railgun, which was designed in the Ioffe Physico-Technical Institute. This railgun can launch small (1–3 mm) plastic impactors with velocities up to 7 km/s. Such velocities can be achieved at normal atmospheric pressure and correspond to dynamic pressure levels up to 40 GPa on the surface of target. The target is kept at temperature of liquid nitrogen during the impact.

Two main fields of our researches are survivability of microorganisms and synthesis of complex organic molecules under high pressure shock waves.

Ability of microorganisms to survive short pulse of high pressure was studied in the first series of experiments. In this experiment dynamic pressure achieved the value 12–15 GPa. We used frozen water solution containing high concentration of cells *Vibrio Sp.X* (CFU $\sim 10^8$ ml⁻³) as a target. After the impact the sample was separated into several layers with average thickness ~ 2 cm. Pressure on the front of shock wave decreases in 10 times on the scale of total length of sample (about 20 cm). As a result, fraction of survived microorganisms in the first layer is less in 3 times than in the last one (rear side of the target).

Experiments on synthesis of complex organic molecules from more primitive in the impact processes will be discussed.