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Synthesis of unsaturated hydrocarbons at the core-mantle boundary
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BELONOSHKO, Anatoly[1] ; LITASOV, Konstantin[2*] ; LUKINOV, Timofiy[1] ; ROSENGREN, Anders[1] ; BRYK, Taras[3]
BELONOSHKO, Anatoly[1] ; LITASOV, Konstantin[2*] ; LUKINOV, Timofiy[1] ; ROSENGREN, Anders[1] ; BRYK, Taras[3]

[1]Department of Theoretical Physics, Royal Institute of Technology, Stokholm, Sweden, [2]VS Sobolev Institute of Geology and Mineralogy, Novosibirsk, Russia, [3]Institute for Condensed Matter Physics, Lviv, Ukraine
[1]Department of Theoretical Physics, Royal Institute of Technology, Stokholm, Sweden, [2]VS Sobolev Institute of Geology and Mineralogy, Novosibirsk, Russia, [3]Institute for Condensed Matter Physics, Lviv, Ukraine

The origin of life on Earth converges to the problem of the origin of first organic molecules, so called 'blocks of life'. The synthesis of complex organic molecules with C-C bonds is possible under conditions of reduced activity of oxygen or at a surface of catalyst via Fischer-Tropsch reaction (Kenney et al., 2002; Lobanov et al., 2013). It is clear, however, that such conditions should have sustainably existed to provide continuous flow of large quantities of organic material. We found, performing *ab initio* molecular dynamics simulations of the C-O-H-Fe system, that such conditions exist no deeper than at the core-mantle boundary of the Earth. H_2O and CO_2 can be delivered to the CMB by subducting slabs. Indeed, carbon and hydrogen can be also emitted from the core itself. The mixture of H_2O and CO_2 subjected to high pressure (130 GPa) and temperature (around 4000 K) does not lead to synthesis of complex hydrocarbons. However, when metallic Fe is added to the system, C-C bonds emerge. Being lighter than the material in the mantle, the hydrocarbons can rise towards the surface via mantle plumes as a part of fluid or melt component, providing the 'blocks of life' for further synthesis of complex organic molecules. Stability of hydrocarbon molecules and their possible mobility as a light component of the plume was argued in recent study of peridotite and eclogite systems with reduced C-O-H fluid (Litasov et al., 2014).Thus, the iron core not only protects Life on Earth creating the magnetic field, but may also create the Life. This means that search for Life on other planets can also be oriented towards the planets with iron cores.

キーワード: high pressure, core mantle boundary, ab initio molecular dynamics, C-O-H fluid, hydrocarbons, iron
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