RESEARCH OF EVOLUTION OF AN ATOMIC ORDER AND VALENCE STATE OF RARE-EARTH ATOMS AND URANIUM IN A NEW METALCARBON COMPOSITE PYROLYZATE OF BIS-PHTHALOCYANINE $C_{64}H_{32}N_{16}Me$ (Me = Y, La, Ce, Eu AND U)

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The bis-phthalocyanine molecule represents two flat C-H-N-complex between which there is an atom of metal. At pyrolysis in the range of T_{ann} =550 - 800°C there is a destruction of the molecules to almost total loss of hydrogen, part of nitrogen and carbon, and due to the released bonds extreme atoms of carbon connect, forming the closed carbon structure in which there is an atom (atoms) of metal. Such metalcarbon composites may be of interest, in particular, to creation thermally, chemically and a radiation resistant metalcarbon matrix for storage and a transmutation of radioactive waste of the spented nuclear fuel of the nuclear power plant.

Pyrolyzates of bis-phthalocyanine of two-, three- and tetravalent rare earths, and also uranium were investigated in the range of pyrolysis temperatures T_{ann}= 800-1700°C. At this general case three types of crystal phases are revealed.

The first phase belongs to carbon component of system and answers the most part of mass of a sample (up to 90%). In process of increase in temperature of pyrolysis (T_{ann}=800-1700°C) crystallographic perfection of the phase gradually grows and in a limit becomes same, as at graphite.

The second phase is a high-temperature phase of crystallized nitrides and carbides, and is observed at T>1100°C. At that a weight share of a crystallized phase and the size of crystallites (in range of 6-90 nanometers) grow with a temperature and annealing time.

The third phase – actually amorphous that testifies to an initial stage of its formation, else at level of a near order. It is possible to assume that, generally in this phase atoms of metal are contained in the cells formed at destruction of bis-phthalocyanine molecules.

In this (amorphous) phase basic elements of pyrolyzates Me are in chemically connected state, but their effective electronic configurations aren't stable and depend on temperature and annealing time. At the same time in case of europium electronic configurations which weren't observed earlier are realized that can testify to specifics of a chemical bond in such systems.

Proceeding from our researches, the amorphous phase with a pyrolysis temperature in T_{ann}=800-1100°C range for practical purposes is represented to more perspective.