

## U-phosphates ( meta-ankoleite, chernikovite) experimentally formed from coffinite

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Uranium has two major oxidation states,  $U^{6+}$  and  $U^{4+}$  in nature. Reduction of the soluble, oxidized form of  $U^{6+}$ , to insoluble  $U^{4+}$  is an important mechanism for the immobilization of uranium in geochemical cycles. It is also important for the formation of uranium ores. Under surface condition, microbial activity has great influence in formation processes of minerals.

We examined varieties of U-minerals from Tohno area, Gifu prefecture and carried out two types of experiments.

Experiment 1. : Coffinite ( having attached bacteria) from Tohno was immersed into water solution which contains Sakurai medium ( glucose, polypepton and yeast extract) . They were left in light place at room temperature. After 2months, we found disk like crystal of meta-ankoleite:  $K(UO_2)(PO_4) \cdot 3H_2O$  near bacteria. This mineral belongs to meta-autunite group.

Experiment 2. Adding coffinite into water solution of Sakurai medium. They were left in dark place at room temperature. After half year, yellowish precipitate formed on the bottom of container. Platy crystals were found around bacteria by TEM. This crystal was identified to be chernikovite:  $H_2(UO_2)_2(PO_4)_2 \cdot 8H_2O$ . Chernikovite also belongs to meta-autunite group and is called hydrogen-autunite, having  $H_3O$  instead of Ca in autunite. Chernikovite formation from natural mineral using natural bacterial assemblages is the first report. So this result suggests possibility that autunite could be formed under bacterial environments in appropriate conditions.