Decomposition of amino acids by irradiation of circularly-polarized ultraviolet light

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Amino acids in terrestrial organisms are fundamentally L-enantiomers. A number of hypotheses have been presented on the origin of such biochemical homochirality. One of them is that enantiomeric excesses of amino acids were generated by circularly-polarized ultraviolet light (CPL-UV) ejected from a neutron star.

In order to examine this hypothesis, we irradiated amino acids or metal complexes of amino acids with circularly-polarized ultraviolet light from a free electron laser of UV-SOR II.

The following aqueous solutions in quartz cuvettes were irradiated with CPL-UV light at 217 nm: DL-Alanine, DL-histidine, copper-complex of DL-histidine, DL-isovaline and copper-complex of DL-isovaline. After irradiation, amino acids in the resulting solutions were analyzed by HPLC with chiral columns.

Isovaline gave DL-alanine as major amino acid products after irradiation, but only a small part of histidine was decomposed under the present condition. No significant enantiomeric excess (*e.e.*) of each amino acid was detected. We irradiated amino acids in neutral solution this time, which might be the reason why no *e. e.* was found. We are planning to irradiate amino acid solution and amino acid metal complex solution with CPL-UV.

Beta-rays are another possible source of unsymmetric decomposition of amino acids. We are also irradiating amino acids and amino acid metal complexes with large flux of beta-rays from a ^{90}Sr-^{90}Y source.