

Belousov-Zhabotinsky 反応系の挙動に対する金属錯体触媒のキラリティーの影響

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Effect of chirality of metal complex catalyst on the behavior of Belousov-Zhabotinsky reaction system (¹*Faculty of Science and Technology, Keio University*) ○Tomoka Anzawa,¹ Taisuke Banno,¹ Kouichi Asakura¹

The BZ reaction is a chemical reaction in which oxidation of organic substrates proceeds in the presence of a metal complex catalyst, and various spatiotemporal patterns are generated in the reaction system. In this study, we investigated the effect of chirality of the metal complex catalyst on the behavior of BZ reaction system. By comparing the reaction behavior when the optically active and racemic complex was used, respectively, it was found that there is a reaction condition in which the oscillation completed into the reduced steady state in the case of the optically active complex while it completed into the oxidized steady state in the case of the racemic complex. In addition, by comparing the behavior of the thin-layered BZ reaction system, a difference was found in the rate for the entire solution to be oxidized. It was considered that these differences are due to the production of chiral organic substances by the oxidation of malonic acid catalyzed by the chiral complex. Behavior of the reaction system when the metal complex catalyst has a polymerizable group was also observed, and the polymerization behavior was compared when the optically active and racemic complex was used, respectively.

Keywords : Belousov-Zhabotinsky reaction; Chemical Oscillation; Spatiotemporal Pattern; Metal Complex Catalyst; Radical Polymerization

Belousov-Zhabotinsky (BZ) 反応は、金属錯体触媒の存在下にて有機基質の酸化が進行する反応で、反応系内で様々な時空間パターンが発生する。本研究では、この BZ 反応系の挙動に対して金属錯体触媒のキラリティーが与える影響を調査した。BZ 化学振動については、光学活性錯体を用いた場合は還元状態にて振動が終了する一方、ラセミ体の場合は酸化状態にて終了するという反応条件の存在が確認された。また、薄層状に展開された BZ 反応溶液系の挙動を比較すると、溶液全体が酸化状態となる速度に違いが見られた。これらの差異は、キラルな錯体触媒によるマロン酸の酸化によりキラルな有機物が生成されたことが要因である可能性が考えられた。さらに、金属錯体触媒が重合性置換基を有する場合の反応系の挙動も観察し、その重合挙動について光学活性錯体の場合とラセミ体錯体の場合で比較した。

