巨大中空錯体に包接された酵素の基質特異性

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Substrate specificity of enzymes encapsulated in giant hollow complexes ([1]*Graduate School of Engineering, The University of Tokyo*, [2]*Institute for Molecular Science*) ○Risa Ebihara,[1] Takahiro Nakama,[1]Makoto Fujita[12]

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To take full advantage of enzymes as an excellent catalyst with high efficiency and specificity, it is required to expand their reaction scope such as substrates and solvents. We have previously reported protein encapsulation into an $M_{12}L_{24}$ spherical complex that forms through the self-assembly of Pd(II) ions (M) and bis(pyridine) ligands (L)(1. The enzyme in the cage was significantly stabilized against heat and organic solvents. In this study, we evaluated the substrate specificity of enzymes confined in an isolated inner cavity of $M_{12}L_{24}$ complexes (Figure 1). The stereoselectivity of enzymes was investigated in denaturing organic solvents where the proteins were stabilized by encapsulation in two sizes of $M_{12}L_{24}$ cages composed of **L1** or **L2**. Lipases in the cage retained their activity in denaturing organic solvents such as dimethylsulfoxide and showed different stereoselectivity from that under aqueous conditions.

酵素のもつ高効率・高選択性の優れた触媒能を生かすため、その基質や溶媒などの適用範囲を拡張することが求められている。我々は以前、配位子と Pd(II)イオンの自己集合により構築される巨大中空錯体へ包接されたタンパク質が、有機溶媒に対して著しく安定化することを見出した(1。本研究では、中空錯体の孤立空間に捕捉された包接タンパク質の酵素活性における基質特異性を評価した(図 1)。配位子 **L1** または **L2** を用いたサイズの異なる 2 種類の中空錯体への包接により安定化された酵素の有機溶媒中での立体選択性を調べた。その結果、包接されたリパーゼは、通常失活するジメチルスルホキシドなどの有機溶媒中で触媒能を保持し、マンデル酸メチルの加水分解反応において水性条件と異なる立体選択性を示すことが明らかになった。

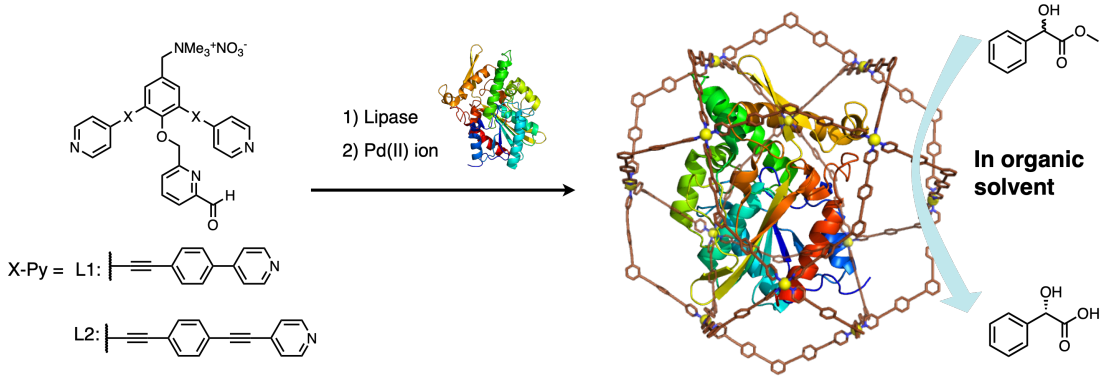

Fig.1 Substrate specificity of lipase stabilized against organic solvents by encapsulation into $M_{12}L_{24}$ cages of different sizes

1) D. Fujita, *et al., Chem,* **2021**, *7*, 2672–2683.