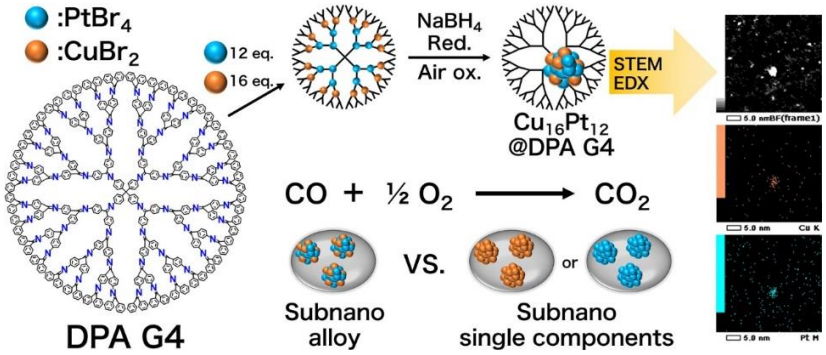
銅-貴金属合金サブナノ粒子の触媒機能評価

（東工大化生研[1]・JST-ERATO[2]）○入内嶋 貴洋[1]・園部 量崇[1]・田辺 真[2]・山元 公寿[1,2]

Catalytic Performance for Copper-Precious Metal Alloy Subnano Particles ([1]*Laboratory for Chemistry and Life Science, Institute of Innovative Research, Tokyo Institute of Technology,* [2]*JST-ERATO*) ○Takahiro Iriuchijima,[1] Kazutaka Sonobe,[1] Makoto Tanabe,[2] Kimihisa Yamamoto[1,2]

Subnanoparticles with ultrasmall particle sizes (<1 nm) exhibit specific geometric structures and electronic states that are different from those of nanoparticles with larger particle sizes. Recently, we reported that subnano copper oxide particles, prepared using a dendritic macromolecular reactor (DPA G4), exhibited elongation of the Cu−O bonds with a decrease in size of the particles on the basis of the XAFS analysis.[1,2)] In addition, subnano noble metal particles have been reported to display high activity over nanoparticles in hydrocarbon oxidative reactions.[3)] In this presentation, we present the preparation of subnano Cu-noble metal alloy particles (SAPs) with atomicity and investigate the catalytic performance in CO oxidation. The Cu-Pt SAPs were prepared using the same DPA G4 template method and characterized by STEM-EDX observation which exists the components of Cu and Pt elements in one particle. The catalytic CO oxidation of Cu-Pt SAPs decreased the reaction temperature, compared to those catalyzed by single component Pt or Cu subnano particles.
Keywords : Nanoparticles; Oxidation; Dendrimer; Carbon monoxide; Copper oxide

十数個の原子で構成されるサブナノ粒子は，ナノ粒子と異なる特異的な幾何構造と電子状態を形成するため，これらに基づく反応選択性及び活性を示す触媒機能が発現する．サブナノ酸化銅粒子の粒子サイズが小さくなると，曲率半径が増大して Cu-O 結合距離が伸長し，酸化反応に対する触媒活性が向上することを見出してた[1,2)]．さらに貴金属サブナノ粒子の様々な触媒反応に適応し，ナノ粒子を超える高い活性を報告した[3)]．本研究では、酸化銅サブナノ粒子の特性を際立たせるために、サブナノ合金粒子 (Subnano Alloy Particles: SAPs) を合成し、CO 酸化反応をモデルとした触媒活性の評価を行った。今回の発表では，触媒活性の構成比に応じてその電子状態が異なることに着目して、CO 酸化反応の開始温度を比較考察した。



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