

Third Laureate Fundamental Research



◆ **Project title:** Preparation and application of biomimetic and environmentally benign catalysts in chemical reactions

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Abstract:

Metalloporphyrins, Schiff base complexes and polyoxometalates are synthetic models for enzymes which catalyze various reactions in body. In this research metalloporphyrin catalysts such as $\text{Mn}(\text{NH}_2\text{TPP})\text{Cl}$, $\text{Mn}(\text{TPPSO}_3)\text{OAc}$, $\text{Mn}(\text{TPP})\text{Cl}$, $\text{Mn}(\text{Br}_8\text{TPP})\text{Cl}$ and metallo-Schiff bases such as $\text{Mn}(\text{salen})\text{Cl}$, $\text{Mn}(\text{salophen})\text{Cl}$ and $\text{Ru}(\text{salophen})\text{Cl}$ have been supported on functionalized polystyrene, silica, zeolite, clays and carbon nanotubes. These heterogeneous catalysts have been used as efficient catalysts in the epoxidation of alkenes, hydroxylation of alkanes, decarboxylation of anti-inflammatory drugs such as ibuprofen and indometacin, oxidation of amines, oxidation of sulfides and oxidation of alcohols under ultrasonic irradiation and under agitation with magnetic stirring. When these catalysts are used, the catalytic activity and selectivity are increased in comparison with homogeneous ones.

Electron deficient tin(IV) porphyrins have also used as mild Lewis acid catalysts for synthesis of fine chemicals.

Polyoxometalates, in the homogeneous form and supported on TiO_2 , SiO_2 , ZrO_2 , MCM-41, functionalized polystyrene and zeolite, have been used as catalyst for synthesis of organic compound.

Supported molybdenum and tungsten based catalysts have been prepared and used as efficient catalyst for oxidation of organic compounds.

These heterogeneous catalysts are recoverable and reusable and can be separated by simple filtration. On the other hand, these catalysts are stable and robust in the reactions. These properties make them useful for practical applications.

