



## Second Laureate Fundamental Research



◆ **Project Title:** Preparation and application of environmentally-benign reagents and catalysts in chemical transformations

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### Abstract:

In this research, some new peroxydisulfate anion ( $S_2O_8^{2-}$ ) based oxidants such as benzyltriphenylphosphonium-, n-butyltriphenylphosphonium-, tetra-n-butyltriphenylphosphonium- and bis(1-benzyl-4-aza-1-azoniabicyclo[2.2.2]octane) peroxydisulfates were prepared and used for different organic transformations including: oxidation of alcohols, thiols, amines and sulfides; oxidative cleavage of carbon-nitrogen double bonds; oxidative deprotection of trimethylsilyl and tetrahydropyranyl ethers.

Also, several catalysts comprising Bi(III) salts such as bismuth trifluoroacetate  $Bi(TFA)_3$  and bismuth triflate  $Bi(OTf)_3$ , Zr(IV) salts such as zirconyl triflate  $ZrO(OTf)_2$ , 12-tungstophosphoric acid supported on  $SiO_2$ ,  $Al_2O_3$ ,  $ZrO_2$  and active carbon were prepared. Some important organic transformations such as esterification reactions, ring opening of epoxides, conversion of epoxides to thiiranes and 1,3-dioxolanes, synthesis of oxazolines, imidazolines, thiazolines, benzoxazoles, benzimidazoles, benzthiazoles and oxazolo[4,5-b]pyridines, synthesis of dibenzoxanthenes and 1,8-dioxo-octahydroxanthenes, trimethylsilylation of alcohols and phenols, synthesis of methoxymethyl and ethoxymethyl ethers and their deprotections were performed in the presence of these catalysts under solvent-free conditions and microwave irradiation. Short reaction times, high product yields, easy preparation, selectivity, stability, relatively non-toxicity and reusability are noteworthy advantages of these reagents and catalysts.