PL-7

ORIENTED EXTERNAL ELECTRIC FIELDS AS EFFECTORS IN CHEMISTRY

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The talk will discuss the wide-ranging potential of using **oriented external-electric-fields (OEEFs) as new effectors of chemical change**.[1–5] Generally speaking, an OEEF along the direction of electron reorganization from reactants to products, will catalyze/inhibit at will nonpolar reactions, while orientations of the OEEF off the "reaction axis" will control selectivity patterns and chiral discrimination.[1,3] The field's direction will similarly affect bonds, molecular structures and aggregation.[5]

I shall discuss OEEF effects, using a selection from the following topics: (a) Control of bond length and strength, and molecular structures,[1,5] (b) control, at will, of non-redox chemical reactions by catalyzing or inhibiting them through a flip of the field's direction, (c) control of regioselectivity (e.g., C=C vs. C-H activation by oxoiron reagents (e.g., P450 like), *exo*/*endo* selectivity in Diels-Alder reactions), (d) control of spin-state selectivity, (e) control of reaction mechanisms, (f) the dilemma of electric fields in enzymes,[5] and (g) control of chiral discrimination and enantioselectivity.[3]

Some future prospects may be discussed as well: (a) the ability of OEEF to act as tweezers that orient the reactants in space and catalyzes their reactions, (b) the role of OEEFs in self-assembly.

As shall be described, there are by now **a variety of experimental techniques** to implement the OEEF idea,[2,5] including **scalable options**.[2b] The field is rapidly expanding. As experimental techniques mature further, chemical transformations may become an exercise in zapping oriented molecules with OEEFs

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