Application of silicon-containing reducing reagents in organic synthesis

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Selective chemical reduction of complex organic molecules was and still remains one of the most frequently tackled problems to modern organic synthesis. Numerous methods permitting reductive functionalization of organic scaffolds are developed to date. Among those the catalytic hydrogenation is one of the basic transformations of organic synthesis that is being used in most of the multistep transformations of industrial importance. In recent years the attention of the chemical community is being directed onto design of new environment friendly and concise synthetic methodologies to substitute the classical catalytic reduction processes. Consequently, the studies on novel sustainable reductive water splitting methods for practical use in catalytic hydrogenation remains one of the *"holy grails"* of modern organic synthesis. On the other hand, the reagents able to abstract oxygen atom, so-called oxygen scavengers, are gaining wide popularity as tools of chose for transformation of organic compounds.

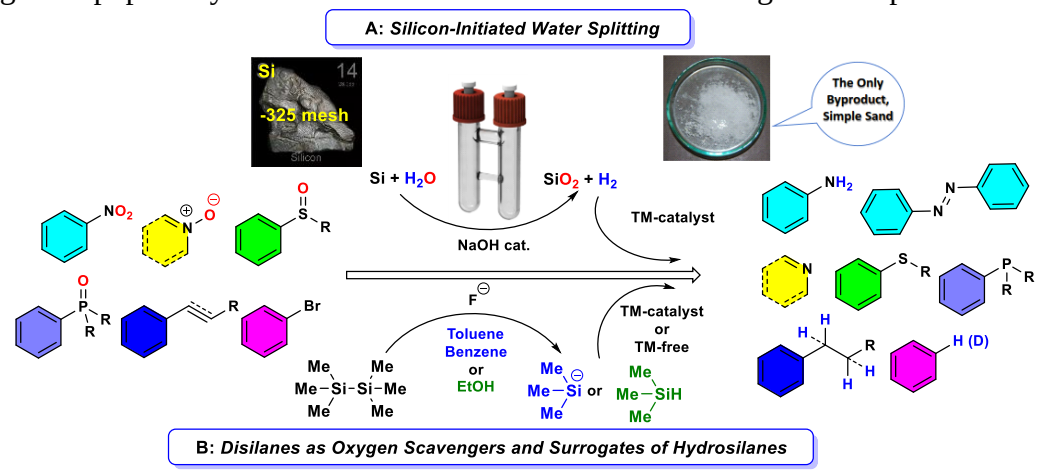

Figure 1.

We elaborated two new strategies for reduction of complex organic molecules (Figure 1), namely: the strategy **(A)** consists in the use of silicon-initiated water splitting as a route for *in situ* generation of hydrogen and subsequent hydrogenation;[1,2] the strategy **(B)** encompasses the use of disilanes as oxygen scavengers and surrogates of hydrosilanes.[3] Both methodologies are holistic concepts displaying high efficiency for reduction not only double and triple bonds but also nitro compounds, N-oxides, sulfoxides, arylhydrazines ect., as well as for hydrodehalogenation and deuterodehalogenation reactions. The scope in each case was studied on more than 50 different substrates. This research program is supported by two NCN grants, namely SONATA 10 (Nr. 2015/19/D/ST5/02774) and till some extend by POLONEZ 2 (Nr. 2016/21/P/ST5/00630, obtained by Dr. Satenik Mkrtchyan, the member of our group).

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