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Reactivity and synthetic applications of silyl chalcogenides

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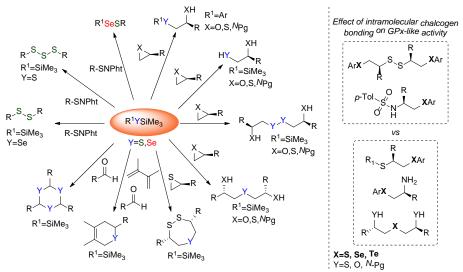
Highlights

Chalcogen-containing nucleophiles, including silyl chalcogenides, behave as versatile reagents in many transformations, allowing to access several classes of biologically important organic molecules, such as antioxidants and enzymes modulators.

Abstract

Organochalcogen compounds are valuable intermediates in organic synthesis and have additional applications in biology, medicinal chemistry, materials science, and catalysis. Sulfur- and selenium-containing small molecules and enzymes have been demonstrated to play a key role in a wide range of biological functions and biochemical mechanisms.¹ More recently, the synthesis and the use of organotellurium compounds have also faced a strong development, due to their unique properties and reactivity. Furthermore, over the past years a high number of selenium- and tellurium-containing catalytic antioxidants have been proposed as synthetic mimics of glutathione peroxidase (GPx), a selenoenzyme that protects organisms against ROS, involved in the onset of several diseases.² In this context, the development of novel methodologies to access chalcogen-containing organic molecules is highly sought after.

Our long standing interest in the study of the reactivity of silyl chalcogenides led us to disclose silicon mediated routes for the synthesis of new variously functionalized S- and Se-containing derivatives.^{3a} More recently, we also focused our attention on the synthesis and the study of organotellurium compounds.^{3b} Such



procedures have been applied to the synthesis of novel cyclic and open chain derivatives that, for their antioxidant and enzyme modulator properties, are potentially useful in biology and medicinal chemistry.

In this communication, synthetic applications of silyl chalcogenides, as well as the synthesis and the evaluation of the antioxidant activity of novel chalcogen-containing small molecules with enhanced GPx-like activity will be discussed.

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- ³ (a) D. Tanini, A. Caperucci, A. Degl'Innocenti, *Eur. J. Org. Chem,.* 2015, 357. (b) D. Tanini, A. Grechi, L. Ricci, S. Dei, E. Teodori, A. Capperucci, *New J. Chem.* 2018, 42, 6077.

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