Università degli Studi di Messina

SEPTEMBER 7-8, 2021

Department of Chemical, Biological, Pharmaceutical and Environmental Sciences

University of Messina

CINMPIS DAYS MESSINA

The Conference will be held online on the **MICROSOFT TEAMS** platform.

The National Interuniversity Consortium of Innovative Synthesis Methodologies and Processes was established in 1994 and placed under the supervision of the Ministry of University and Scientific and Technological Research in 1998. It has its registered office at the University of Bari (Palazzo Ateneo) and administrative office at the Department of Pharmacy – Pharmaceutical Sciences of the same University. It currently includes 14 Italian Universities from all over Italy: South (Bari, Basilicata, Salento, Calabria, Catania, Messina, Naples, Cagliari), Center (Camerino, Perugia, Florence) and North (Bologna, Pavia and Milan-Bicocca). From its foundation it was directed by Prof. Saverio Florio until 2013, and subsequently by Prof. Alberto Brandi (2013-2016). CINMPIS is currently headed by Prof. Vito Capriati of the University of Bari.

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IV Firenze, October 22, 2004 (University of Firenze)

V Bari, November 7, 2005 (University of Bari)

VI Bologna, October 13, 2006 (University of Bologna)

VII Napoli, November 29, 2007 (University of Napoli Federico II)

VIII Milano, November 25, 2008 (University Statale di Milano)

IX Padova, September 2, 2009 (Complesso San Gaetano)

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XI Bari, November 25, 2011 (University of Bari)

XII Milano, December 3, 2012 (University of Milano-Bicocca).

XIII Perugia, December 18, 2013 (University of Perugia)

XIV Bari, September 29-30, 2014 Ventennium Conference (University of Bari)

XV Napoli, December 11-12, 2015 (University of Napoli Federico II)

XVI Rende, Campus Scientifico, December 16-17, 2016 (University of Calabria)

XVII Cagliari, December 15-16, 2017 (University of Cagliari).

XVIII Bologna, February 18-19, 2019 (University of Bologna).

XIX Pavia, February 20-21, 2020 (University of Pavia)

CINMPIS LECTURES

CINMPIS Lecturer 2012 Prof. Ilan Marek, Technion – Istrael Institute of Technology, Haifa, Israel

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GREEN AND SAFE HYDROGENATIONS IN DEEP EUTECTIC SOLVENTS

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The reduction of nitrogen- and oxygen-containing functional groups, as well as the catalytic semihydrogenation of alkynes to access *cis*-alkenes, is of great importance in organic synthesis since reduction products are essential structural units in many natural products, pharmaceuticals, and agrochemicals [1]. Hydrogen is an explosive gas, its production needs extensive energy and generates a considerable amount of carbon dioxide. Therefore, the development of cost-effective reduction methods that use safe reagents, environmentally friendly solvents and prevent or minimize waste formation represents a challenge of great interest in sustainable chemistry. Continuing our interest in developing sustainable synthetic methodologies, herein, we describe an alternative and safe palladium-catalyzed hydrogenation reaction in Deep Eutectic Solvents (DESs, Figure 1), unconventional green solvents displaying low toxicity, high biodegradability, and renewability [2]. The use of aluminum powder in combination with water and a base, in DESs, results in an environmentally responsible and controlled *in-situ* formation of hydrogen [3]. Our optimized protocol was effective for the reduction of a wide range of molecules, containing C–C, C–N, C–O, N–O multiple bonds, as well as, changing the nature of DES components, the stereoselective semihydrogenation of alkynes to cis-alkenes was achieved, leading to the desired products in yield up to 99%. The simplicity, tunability, recyclability and the environmentally benign character of both catalytic system and DESs, offer numerous advantages over the currently available reduction methods, performed in toxic volatile organic solvents and employing external and pressurized dangerous H_2 source.

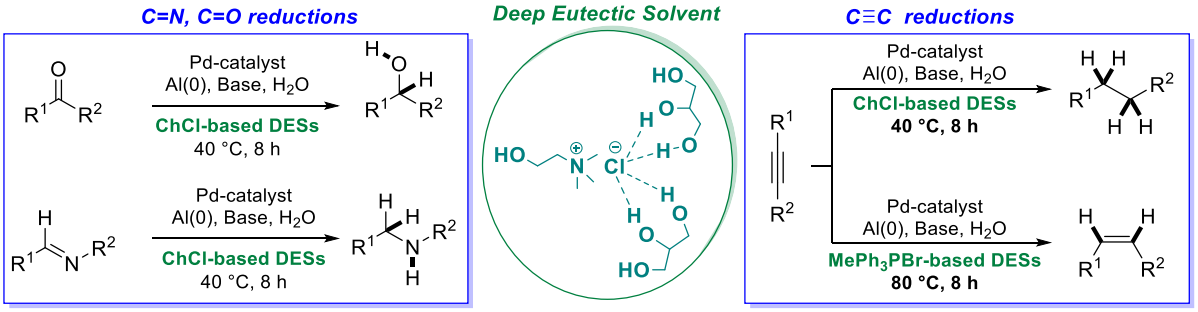

Figure 1

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[2] a) Messa, S. Perrone, M. Capua, F. Tolomeo, L. Troisi, V. Capriati, A. Salomone, *Chem. Commun.*, **2018**, *54*, 8100; b) S. Perrone, M. Capua, F. Messa, A. Salomone, L. Troisi, *Tetrahedron*, **2017**, 73, 6193; c) M. Capua, S. Perrone, F. M. Perna, P. Vitale, L. Troisi, A. Salomone, V. Capriati, *Molecules*, **2016**, *21*, 924.
[3] C. Schäfer, C. J. Ellstrom, H. Cho, B. Török, *Green. Chem.*, **2017**, *19*, 1230.