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Divisione di Chimica Organica

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INDICE

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Lunedì 9 Settembre 2019: Prima sessione Poster – h 13.00-15.00.

Autore Presentatore	Titolo	Codice
T. Tedeschi	Study of Milk Proteins' Digestibility: Characterization of the Peptide Fraction Released and Potential Impact on Allergenicity	**PC-01**
C. Coppola	Design of novel organic hole transport materials for perovskite solar cells	**PC-02**
S. Tallarico	Alternative Chemocatalytic Methods for Selective Conversion of Cellulose into Lactic Acid	**PC-03**
S. Nejrotti	Natural deep eutectic solvents as an efficient and versatile catalytic system for the Nazarov cyclization	**PC-04**
A. Rinaldi	Synthesis of Indenes by Tandem Gold(I)-Catalyzed Propargyl Claisen Rearrangement/Hydroarylation Reaction	**PC-05**
R. Mancuso	PdI2-Catalyzed Carbonylative Approach to Benzothiophene Derivatives from (2-Alkynyl)(methylthio)benzenes	**PC-06**
C. Rizzo	Hybrid ionogels as potential antioxidant agents	**PC-07**
F. Billeci	Gluconic acid for eco-friendly Ionic Liquids: chemical and biological investigations.	**PC-08**
S. Marullo	Conversion of carbohydrates into 5-HMF in Deep Eutectic Solvents under mild reaction conditions	**PC-09**
M. Massaro	Zinc oxide nanoparticles supported on halloysite nanotubes for environmental remediation	**PC-10**
E. Azzi	Visible-Light-Driven Synthesis of Tetrahydropyridazines from γ-δ Unsaturated N-Tosylhydrazones	**PC-11**
E. Mezzina	Synthesis and EPR investigation of a new stable diradical macrocycle	**PC-12**
T. Laurita	Regio- and diastereoselective organo-zinc promoted arylation of trans 2,3-diaryloxiranes by arylboronic acids: stereoselective access to trans 2,3-diphenyl-2,3-dihydrobenzofuran.	**PC-13**
P. La Manna	Green and Mild Friedel-Crafts Benzylation of Arenes and Heteroarenes Under On Water Conditions	**PC-14**
R. D'Orsi	From HIV protease inhibitors to anticancer agents: diversity-oriented synthesis of new compounds with double biological activity	**PC-15**
A. Campofelice	New Molecules as Translational Readthrough Promoters of Nonsense Mutations: Rescuing the CFTR Protein	**PC-16**
F. Buonsenso	A novel procedure for rapid and accurated quantification of amino functionalities bonded to solid porous matrices	**PC-17**
C. Capacchione	Synthesis of new Water Reducer Plasticizers for concrete, gypsum and clay	**PC-18**
L. Menduti	Boron-functionalized benzodithiophenes	**PC-19**
M. Novello	New Synthesis of 4-Iodothienopyranone Derivatives by Iodocyclization Reaction	**PC-20**
M. Cirillo	Development of new beta-lactam-based integrin ligands: Synthesis and Applications	**PC-21**
A. Massi	Enantioselective Desymmetrization of 1,4-Dihydropyridines by Oxidative NHC-Catalysis	**PC-22**
C. Bellomo	Functionalization of the BODIPY core with styryl carboranes: synthesis, characterization and photophysical properties.	**PC-23**
M. Blangetti	Chemoselective Addition of Highly Polar Organolithium Reagents to Carboxamides in Deep Eutectic Solvents (DESs)Under Air: Novel Opportunities for the Synthesis of Ketones in Unconventional Solvents	**PC-24**
P. Russo	A New Synthesis Of 2-(imidazo[1,2-a]pyridin-3-yl)acetamides By Palladium-Catalyzed Oxidative Aminocarbonylation Of (N-Prop-2-yn-1-yl)pyridin-2-amines	**PC-25**

COMUNICAZIONI POSTER
Sessione 1

PC-09

Conversion of carbohydrates into 5-HMF in Deep Eutectic Solvents under mild reaction conditions

S. Marullo, C. Rizzo, R. Noto, F. D'Anna

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Faced by pressing challenges like the depletion of fossil fuels, researchers are putting intense focus on the replacement of current feedstocks with renewable and sustainable sources, like lignocellulosic biomass, for the obtainment of industrially relevant chemicals.[1] To this aim, in agreement with the principles of Green Chemistry, the use of environmentally friendly and safe solvents, as well as mild reaction conditions are factors of paramount importance. In this context, the latest development is represented by Deep Eutectic Solvents (DES).[2] These are mixtures which, at a particular composition, display a definite melting point, lower than those of each individual component. Oftentimes they are composed of cheap and naturally occurring components and their preparation requires only a mixing process, without any synthetic of purification step.[3] In the framework of our interest in biomass valorisation in non-conventional solvents,[4,5] we studied the conversion of fructose and sucrose, into the chemical platform 5-hydroxymethylfurfural (5-HMF). The reactions were promoted by the resin Amberlyst 15, in a wide range of DES differing for the nature of the hydrogen bonding donating and accepting components (Figure 1).

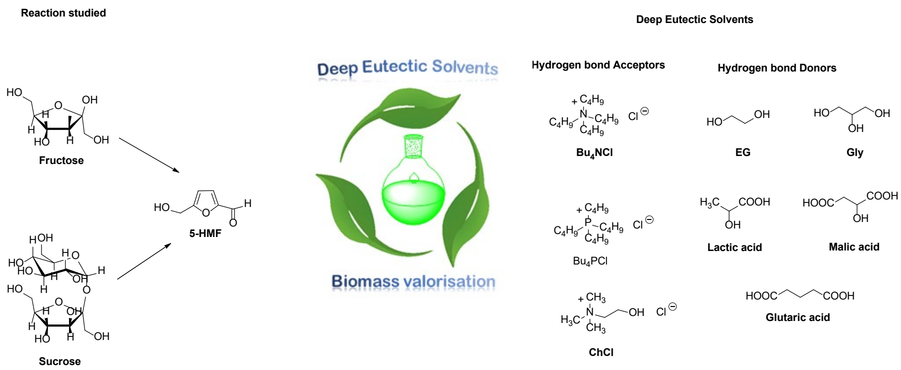

Figure 1: Reaction studied and DES used.

From our study, we found that coupling Amberlyst 15 with carboxylic acid-based DES allowed us to obtain high yields of 5-HMF under the relatively low temperature of 60 °C for fructose and 80 °C for sucrose, which are competitive with what reported in literature, but without using strong acids or transition metal salts as catalysts. The structure of the hydrogen bond donor dramatically affects the reaction outcome. Finally, we also investigated the recyclability of the best-performing DES.

References:

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[5] S. Marullo; C. Rizzo; A. Meli; F. D'Anna, *ACS Sustainable Chem. Eng.* **2019**, *7*, 5818-5826.