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# Synthesis of C4 diacid from biomass-based furanics derivatives

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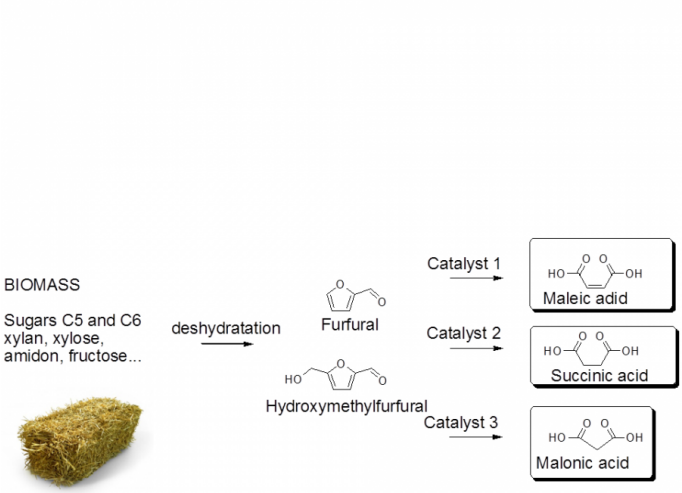
## PURPOSE OF THE ABSTRACT

Four carbon 1,4-diacids are in the center of intensive research. Maleic (MA), malic, fumaric and succinic acids are among the stars of the DOE's top 12 biobased molecules list. They are widely used in the chemical industry, thought an important panel of applications as for examples production of paints and coating, (un)saturated polyesters resins, plasticizers, copolymers, lubricant additives and preservative in food and beverages.1 They can be used for replacement products coming from petroleum feedstock, like phthalic anhydride or adipic acid. Succinic and Maleic acid are particularly interesting as key building block. Maleic acid could be derivated in all the three 1,4-diacids mentioned previously and also to maleic anhydride, butanediol, and tetrahydrofuran.2 As maleic acid is the hydrated form of maleic anhydride the most widespread derivative, his market can be studies throught maleic anhydride production. Currently the production of maleic anhydride is estimated more than 2000 ktons per year.

Furfural and 5-hydroxymethylfurfural (HMF) are biomass-derived molecules. They are obtained by dehydration under acidic conditions of sugars resources, for examples xylose, arabinose and xylane contained in hemicelluloses and lignocellulosic agro-residues. Currently annual production of furfural is around 250-400 ktons, the majority coming from China.3 Oxidation of furfural to maleic acid or maleic anhydride have been explored by many research groups. Theses transformations could be performed under homogeneous or heterogeneous catalysis in gaz or liquid phase.

We will report our results of production of maleic acid, succinic and malonic acid, and shows how they were obtained by green oxidation of inedible biomass-based on furaldehyde or others furanics derivatives. The transformations were carried out in the presence of different catalytic system comprising: (1) green solvents; (2) robust heterogeneous catalysts which are highly recyclables. Strong synergetic effect were observed, the transformation was accelerated. With the optimized conditions succinic, maleic, and/or malonic acids were selectively obtained. In most of the cases, a fast and simple purification by filtration and evaporation were enough to get high yield of biobased dicarboxylic acid. The process was scale up under continuous flow conditions.

## FIGURES




## FIGURE 1

Biobased Dicarboxylic acid from renewable resources

Valorisation of lignocellulosic agro-residues to dicarboxylic acids.

## FIGURE 2


## KEYWORDS

Furanics derivatives | green catalysts | dicarboxylic acid | catalytic oxidation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