SUPPLEMENTARY INFORMATION

S1.- Chemoenzymatic synthesis of FDCA in a continuous packed-bed mode operation

The equipment for the chemoenzymatic synthesis of FDCA in a continuous packed-bed millireactor is depicted in Figure S1.

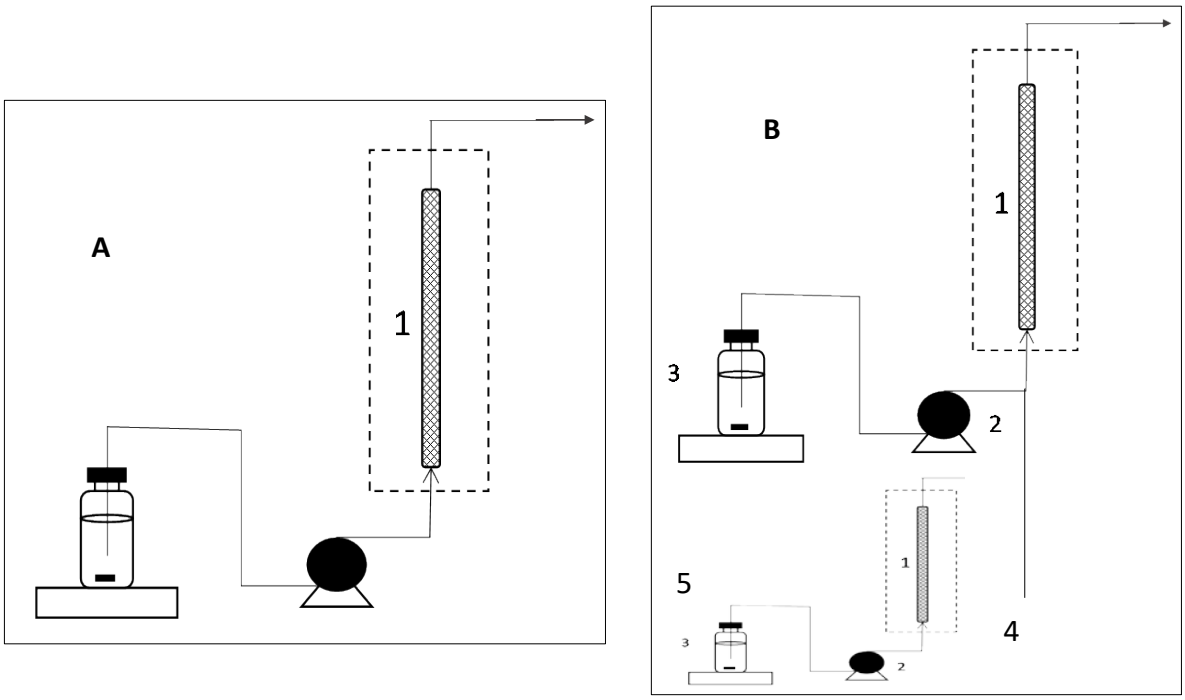

Figure S1. Continuous packed-bed reactor to produce FDCA. A) System with one inlet, B) System with two inlets. (1) packed-bed column (biocatalyst) (2) peristaltic pump and (3) reaction media (3). B) System with two inlets. (1) packed-bed column (biocatalyst) (2 and 4) peristaltic pumps and (3) Ethyl acetate plus DFF and (5) H_2O_2.

S2. Determination of the void fraction in the continuous packed-bed bioreactor

The void volume was calculated by experimentally determining the average particle size of the biocatalyst (average value determined by scanning electron microscope) and the correlation by Benyahia and O'Neill, 2005. Equation S1 details the calculation:

$$\epsilon = 0.390 + \frac{1.740}{\left(\frac{d_t}{d_P}+1.140\right)^2} \quad \text{(S1)}$$

Where d_t is the diameter of the column and d_P is the diameter of the biocatalyst.

If d_t and d_P are 0.4 and 0.063 cm, respectively, replacing these values in the equation S1 the void volume is 0.42.

S3. Residence times in continuous packed bed millibioreactor

Figure S2 shows the residence times in the continuous packed bed reactor.

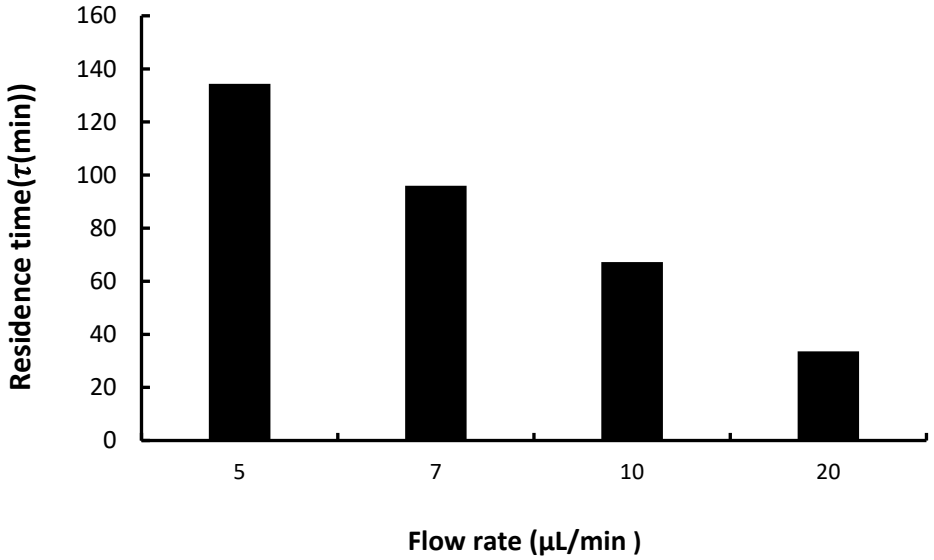

Figure S2. Residence times in operation with continuously packed bed bioreactor