Title:	Realizing direct conversion of glucose to furfurals with tunable selectivity utilizing a carbon dot catalyst with dual acids controlled by a biphasic medium
Authors:	Devi, Bhawana (/jspui/browse?type=author&value=Devi%2C+Bhawana)
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Abstract:	Developing cost-effective processing strategies for the preparation of fuel-precursor chemicals, including 5-hydroxymethylfurfural (HMF) and furfural, has been dedicatedly researched over the last few years. These compounds are typically produced using different carbohydrate sources, say furfural using xylose and HMF using glucose. Herein, we report the significant formation of both these furfurals using a single glucose source over the fine-tuned Fe2+@SO3-CD nanocomposite. The catalyst exhibiting two different acidic sites, such as Lewis and Brønsted, developed by the iron (II) metal and sulfonate groups, respectively, offered a synergistic effect on the glucose decomposition into furfurals. Mechanistically, the iron (II) Lewis metal acid sites play a vital role in the significant formation of furfurals. Furthermore, the THF/H2O biphasic system influenced a selective formation of HMF and furfural, achieving as high as 85% HMF (94% selectivity) in 1:2 THF/H2O and 56% furfural (90% selectivity) in 1:1 THF/H2O. The recyclability study showed that the catalyst is effective for 4 cycles. The green metrics analysis of the solid acid catalysis represented a greener strategy for furfurals production. Overall, the catalytic setup can be upscaled because of the involvement of cheaper precursors and less labor-intensive catalyst preparation.
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