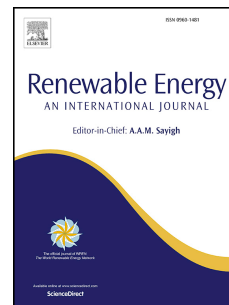


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Preparation and performance investigation of a lignin-based solid acid catalyst manufactured from olive cake for biodiesel production

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3 **Preparation and Performance Investigation of a Lignin-Based Solid Acid**
4 **Catalyst Manufactured from Olive Cake for Biodiesel Production**

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13 **Abstract**

14 In this study, the olive cake was successfully developed and applied as a substrate to
15 produce a lignin-based catalyst for biodiesel production. Three lignin-based solid acid
16 catalysts were prepared from the incomplete carbonized alkali lignin using concentrated
17 sulfuric acid. The catalyst underwent a detailed characterization analysis in terms of its
18 functional groups of active sites, surface area, acid sites density and morphological
19 structure. For the catalytic activity test, prepared catalysts were studied for their ability to
20 catalyze both esterification and transesterification reactions of waste vegetable oil (WVO)
21 ≈ 2 FFA (% w/w).

22 The results revealed that a sulfonated lignin-derived acid catalyst has a high potential to
23 esterify waste vegetable oil to about (92%) conversion. Furthermore, it demonstrated about
24 57% conversion to fatty acid methyl esters (FAME) under the following optimum

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