PAPER

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The green synthesis of a palm empty fruit bunch-derived sulfonated carbon acid catalyst and its performance for cassava peel starch hydrolysis

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A sulfonated carbon acid catalyst (C–SO_3H) was successfully generated from palm empty fruit bunch (PEFB) carbon *via* hydrothermal sulfonation *via* the addition of hydroxyethylsulfonic acid and citric acid. The C–SO_3H catalyst was identified as containing 1.75 mmol g^{-1} of acid and 40.2% sulphur. The surface morphology of C–SO_3H shows pores on its surface and the crystalline index (CrI) of PEFB was decreased to 63.8% due to the change structure as it became carbon. The surface area of the carbon was increased significantly from 11.5 to 239.65 m^2 g^{-1} after sulfonation *via* hydrothermal treatment. The identification of –SO_3H, COOH and –OH functional groups was achieved using Fourier-transform infrared spectroscopy. The optimal catalytic activity of C–SO_3H was achieved *via* hydrolysis reaction with a yield of 60.4% of total reducing sugar (TRS) using concentrations of 5% (w/v) of both C–SO_3H and cassava peel starch at 100 °C for 1 h. The stability of C–SO_3H shows good performance over five repeated uses, making it a good potential candidate as a green and sulfonated solid acid catalyst for use in a wide range of applications.