Supporting Information

Efficient Biogas and Ethanol Production from Safflower Straw Using Sodium Carbonate Pretreatment

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Morphological structural changes of the safflower straw samples before and after the Na_2CO_3 pretreatment were studied by scanning electron microscopy (SEM). The dried treated and untreated samples were coated with thin layer of gold (BAL-TEC SCD 005) and analyzed by SEM (PHILIPS, XL30) at 15 kV.

SEM images of treated and untreated safflower straw were captured to investigate the morphological destructive effect of Na_2CO_3 pretreatment. As Fig. 1 indicates, the untreated sample had a compact, inaccessible, and packed structure with negligible porosity. Due to the pretreatment, this structure has been converted to an open and swollen structure with a large number of pores; hence, it became more accessible for enzymes and microorganisms for biological degradation applied after the pretreatment.

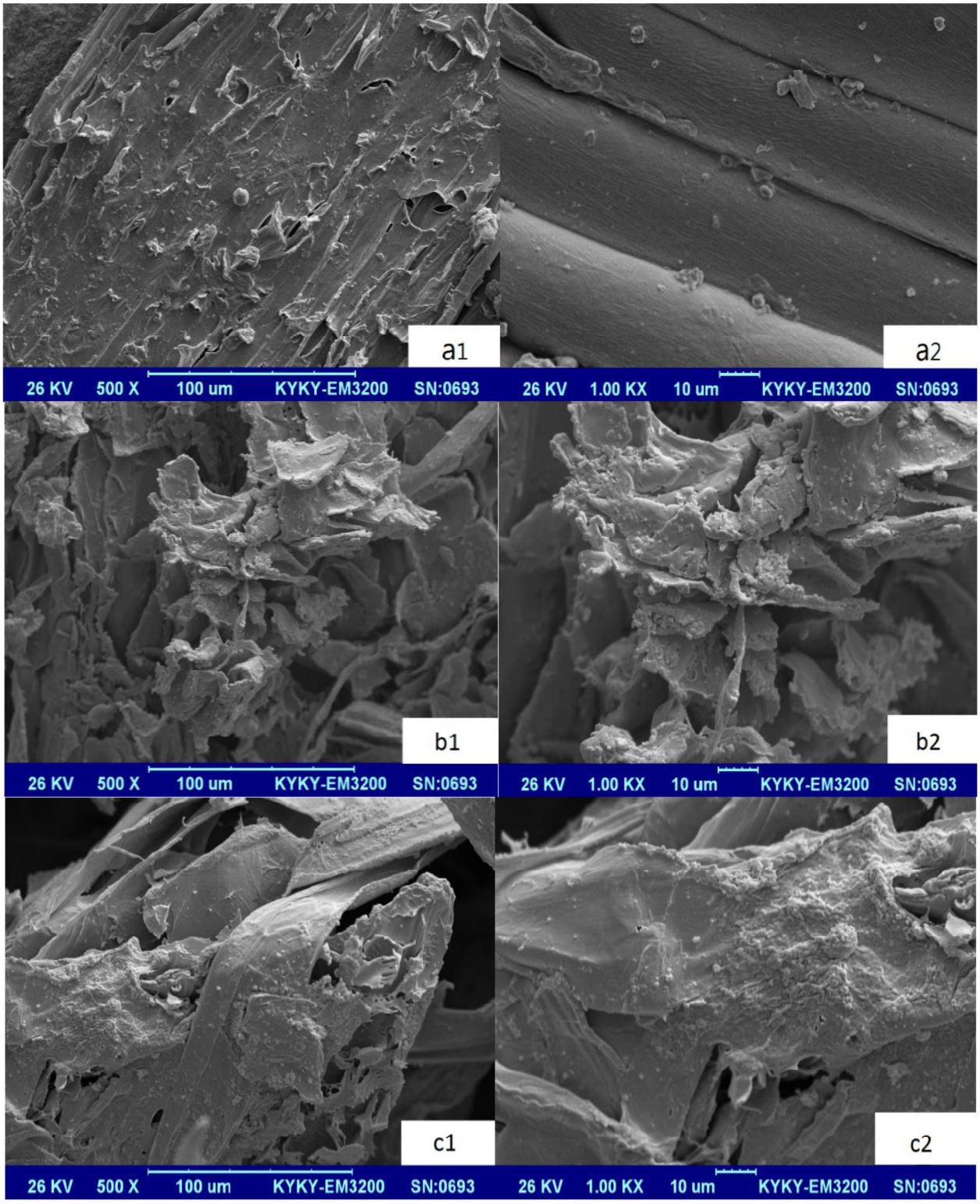

Figure S1. SEM images of (a) untreated straw as well as the straw pretreated with (b) 1 M Na_2CO_3 at 180 °C for 2 h and (c) 0.5 M Na_2CO_3 at 180 °C for 5 h obtained at magnification of 500X and 1000X.