Extended Supplementary Information for:

Intensification and deactivation of Sn-Beta investigated in the continuous regime

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Figure S1. A selection of XRD patterns of ex reactor catalyst samples. From top to bottom: SiC, fresh catalyst/SiC mixture, ex reactor (100 °C) sample/SiC mixture, ex reactor (120 °C) sample/SiC mixture, ex reactor (140 °C) sample/SiC mixture. All ex reactor samples were measured after 250 h on stream.
Figure S2. UV-Raman spectrum of (a) fresh catalyst/SiC mixture, and (b) ex reactor (140 °C) sample/SiC mixture after 150 h on stream. The presence of the carbon G-band clearly indicates the presence of carbonaceous material in the used sample.

Figure S3. ‘H NMR spectra of the supernatant solution after washing the ex reactor catalyst in CD$_3$Cl. Clear resonances from both alcohol species (2-butanol and cyclohexanol) are observed, whilst no signals from the corresponding ketones are found.
Figure S4. Catalytic activity of 10Sn-Beta during TH of furfural. Open squares represent the continuous experiment performed with fresh catalyst, whilst filled triangles represent a continuous test of the same sample tested after an initial 550 °C calcination prior to continuous operation.

Table S1. EDX analysis and porosimetry data from fresh and used Sn-Beta catalysts.

<table>
<thead>
<tr>
<th>Catalyst</th>
<th>Sn wt. %a,1</th>
<th>SSA (m² g⁻¹)b,2</th>
<th>V_MICRO (cm³ g⁻¹)c,2</th>
<th>normalized V_MICRO (cm³ g⁻¹)c,2</th>
</tr>
</thead>
<tbody>
<tr>
<td>fresh catalyst/SiC</td>
<td>4.9 ± 0.5</td>
<td>66.5</td>
<td>0.046</td>
<td>0.23</td>
</tr>
<tr>
<td>ex reactor (140 °C) sample/SiC mixture after 150 h on stream</td>
<td>4.4 ± 0.6</td>
<td>26.4</td>
<td>0.022</td>
<td>0.11</td>
</tr>
</tbody>
</table>

a Determined by EDXS; b Specific surface area determined from nitrogen adsorption using the BET equation; c Micropore volume determined from nitrogen adsorption isotherms using the de Boer t-plot method.

1 The entire catalyst sample (included diluent) was measured. Three different areas of 29 micron of diameter were analysed and the averaged value was taken. Values are not normalised for composition (i.e. % catalyst in mixture) due to issues with relative dispersion and the semi-surface sensitive nature of the technique.

2 The entire catalyst sample (included diluent) was measured, and these are the raw values.

3 Values were normalised from the data obtained in (2) according to the relative content of catalyst in the mixture, as the diluent does not contribute to the micropore volume.