New insights into the synthesis of Sn-Beta catalyst

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Zeotype Sn-Beta has proven to be an active and versatile catalyst in a range of interesting reactions, especially within the emerging biorefinery sector, such as selective carbohydrate conversion. Despite many potential uses of Sn-Beta, fundamental understanding of the synthesis parameters is necessary to elucidate structure-activity correlations to help the development of industrial applications.

With the aim of studying the effect of the crystallization time and tin content on the final material, a sample matrix of varying hydrothermal reaction times and tin ratios was prepared. Tin was found to severely retard the crystal growth, increasing the required crystallization time notably, while also affecting the crystal morphology resulting in highly truncated bipyramidal crystals for high tin contents (Figure 1a).

By investigating transverse sections of the crystals using an electron microprobe (EMP), it was possible to precisely map the tin-distribution within the bulk of the crystals. Surprisingly, tin was found to be almost absent from the core of the crystals, as it can be observed in Figure 1b.

These results show that the morphology of the catalyst and distribution of tin sites can be tailored, which can potentially improve the catalytic performance by increasing the number of more accessible sites in the outer rims of the catalyst.

a) b)

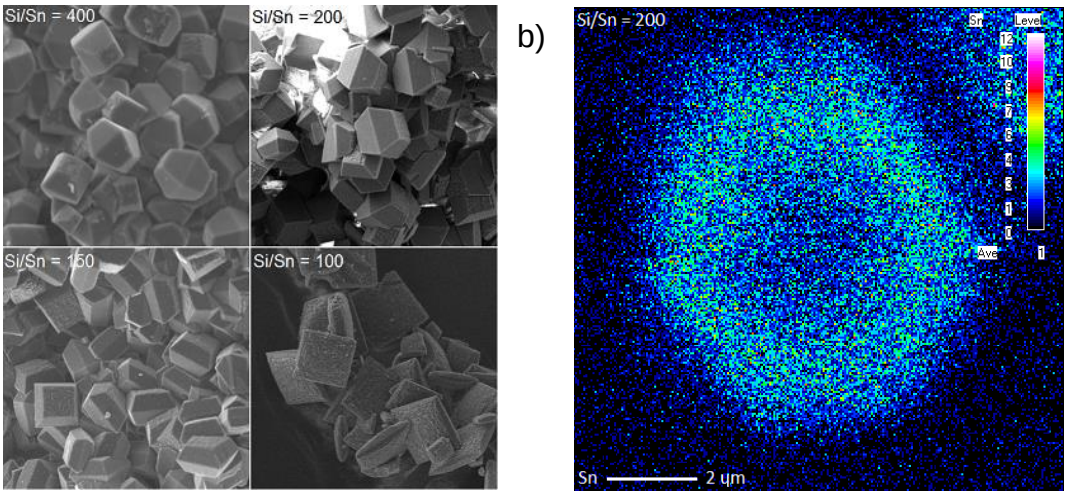

Figure 1. a) Sn-Beta samples of varying tin content, b) tin distribution within a Sn-beta crystal.