

Supporting Information

The Role of Alkali Metal Exchange in Zeolite-Templated Carbon Synthesis

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Structural Packing Density Example Calculations

The structural packing density (SPD) can be calculated using the data obtained from thermogravimetric analysis (see **Figure S1**), where in this case m_i and m_f are measured to be 8.55 mg and 6.36 mg, respectively.

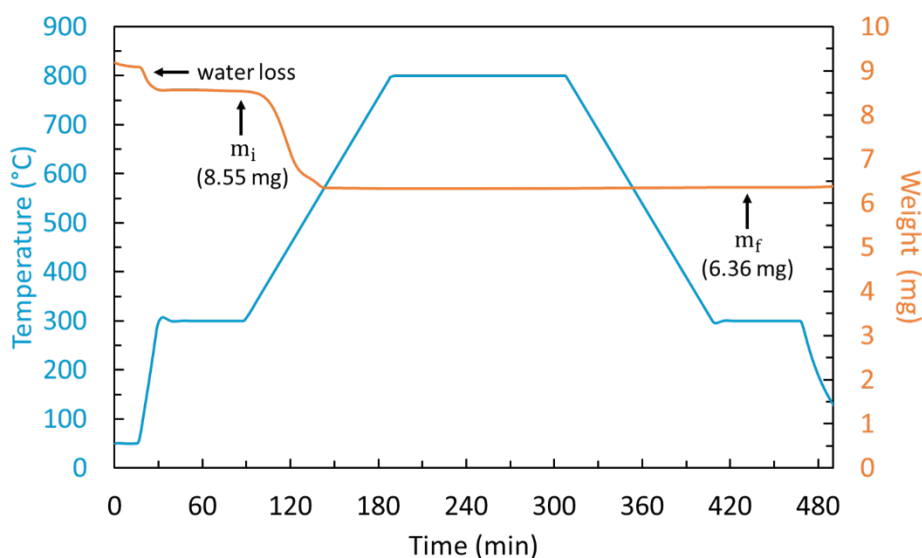


Figure S1. Thermogravimetric data of ZTC inside of zeolite template while heating under exposure to air.

$$\text{SPD}_{\text{exp}} = \frac{m_{\text{ZTC}}}{m_{\text{zeolite}}} = \frac{m_i - m_f}{m_f} = g_{\text{ZTC}} g_{\text{zeolite}}^{-1} \quad (1)$$

$$\text{SPD}_{\text{cell}} = \text{SPD}_{\text{exp}} \times \frac{\text{MW}_{\text{zeolite}}}{\text{MW}_{\text{SiO}_2}} = g_{\text{ZTC}} g_{\text{SiO}_2}^{-1} \quad (2)$$

Thus, from **Equation 1**,

$$\text{SPD}_{\text{exp}} = \frac{m_i - m_f}{m_f} = \frac{8.55 \text{ mg} - 6.36 \text{ mg}}{6.36 \text{ mg}} = 0.344 \text{ g}_{\text{ZTC}} \text{ g}_{\text{zeolite}}^{-1}$$

To convert from SPD_{exp} to SPD_{cell} the molecular weight of the zeolite can be used. For this example, the zeolite used is Tosoh NaY ($5.5\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{Na}_2\text{O}$), thus the molecular weight of the zeolite is defined as:

$$\text{MW}_{\text{zeolite}} = 5.5(60.08 \text{ g mol}^{-1}) + 101.96 \text{ g mol}^{-1} + 61.98 \text{ g mol}^{-1} = 494.38 \text{ g mol}_{\text{zeolite}}^{-1}$$

The corresponding pure SiO_2 version of this zeolite would take the form of 7.5SiO_2 . Therefore, the molecular weight of the corresponding pure SiO_2 zeolite would be:

$$\text{MW}_{\text{SiO}_2} = 7.5(60.08 \text{ g mol}^{-1}) = 450.60 \text{ g mol}_{\text{SiO}_2}^{-1}$$

Now, using **Equation 2**, SPD can be converted to SPD_{cell} , which is a comparable metric across all ZTCs synthesized inside the same type of zeolite framework (example **FAU**).

$$\text{SPD}_{\text{cell}} = 0.344 \text{ g}_{\text{ZTC}} \text{ g}_{\text{zeolite}}^{-1} \times \frac{494.38 \text{ g}_{\text{zeolite}} \text{ mol}^{-1}}{450.60 \text{ g}_{\text{SiO}_2} \text{ mol}^{-1}} = 0.377 \text{ g}_{\text{ZTC}} \text{ g}_{\text{SiO}_2}^{-1}$$