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 mᵢ and mᵥ are measured to be 8.55 mg and 6.36 mg, respectively.

\[
SPD_{\text{exp}} = \frac{m_{\text{ZTC}}}{m_{\text{zeolite}}} = \frac{m_i - m_f}{m_f} = \frac{g_{\text{ZTC}}}{g_{\text{zeolite}}} \quad (1)
\]

\[
SPD_{\text{cell}} = SPD_{\text{exp}} \times \frac{MW_{\text{zeolite}}}{MW_{\text{SiO}_2}} = \frac{g_{\text{ZTC}}}{g_{\text{SiO}_2}} \quad (2)
\]

Figure S1. Thermogravimetric data of ZTC inside of zeolite template while heating under exposure to air.
Thus, from \textbf{Equation 1},

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

To convert from SPD\textsubscript{exp} to SPD\textsubscript{cell} the molecular weight of the zeolite can be used. For this example, the zeolite used is Tosoh NaY (5.5SiO\textsubscript{2} \cdot Al\textsubscript{2}O\textsubscript{3} \cdot Na\textsubscript{2}O), thus the molecular weight of the zeolite is defined as:

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

The corresponding pure SiO\textsubscript{2} version of this zeolite would take the form of 7.5SiO\textsubscript{2}. Therefore, the molecular weight of the corresponding pure SiO\textsubscript{2} zeolite would be:

\[
MW_{\text{SiO}_2} = 7.5(60.08 \text{ g mol}^{-1}) = 450.60 \text{ g mol}^{-1}_{\text{SiO}_2}
\]

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

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