

Millipede-inspired structural design principle for high performance polysaccharide binders in silicon anodes

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We systematically investigate polysaccharide binders for high-capacity silicon anodes in lithium ion batteries to find critical factors for the binder function. Analogous to the millipede's strong adhesion based on adhesive pads located on each leg, xanthan gum exhibits the best performance by utilizing its double helical superstructure with side chains and ion-dipole interactions, revealing the great importance of the superstructure and charge interactions in the Si binder design.