

Rice husk-derived 3D-porous Si anode for high performance LIB anodes

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The rice husk (RH) is the outer covering of a rice kernel and protects the inner ingredients from external attack by insects and bacteria. To perform this function while ventilating air and moisture, rice plants have developed unique nanoporous silica layers in their husks through years of natural evolution. Despite the massive amount of annual production near 10^8 tons worldwide, so far rice husks have been recycled only for low-value agricultural items. In an effort to recycle rice husks for high-value applications, we convert the silica to silicon and use it for high performance lithium ion battery (LIB) anodes. Taking advantage of the interconnected nanoporous structure naturally existing in rice husks, the converted silicon (Si) exhibits excellent electrochemical performance as a lithium battery anode, with high reversible capacity (1615 mAh/g) and long cycle life (82% capacity retention over 500 cycles). Thus, we suggest that rice husks can be a sustainable resource for use in high-capacity lithium battery negative electrodes. This work was supported by a National Research Foundation of Korea (NRF) grants funded by the Korean Ministry of Education and Science Technology (MEST) and published in PNAS.