OAK RIDGE NATIONAL LABORATORY
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Lignin-based Active Anode Materials Synthesized from Low-Cost Renewable Resources

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Technology Summary

Lithium-ion battery packs in hybrid electric vehicles (HEVs) and fully electric vehicles (EVs) in the near term will contain carbon-based active materials in the anode. However, full market penetration will require further non-incremental improvements in cyclic capacity at lower costs. Typical state of the art lithium battery anodes are composites of 90% (by mass) graphitic carbon and 10% polymeric binder coated onto metallic copper current collectors. Carbon fibers, which are mixed ionic/electronic conductors with relatively high electrical conductivities >50 S/cm, can be readily extruded into desired morphologies prior to pyrolysis, thus enabling a complete redesign of the anode by functioning as both current collector and active material. The present invention comprises an active, low cost battery material obtained from a renewable resource. This material can be made binder-free, eliminating a major cost in battery materials. The electrochemical performance can be tuned for high specific power or high specific energy. Additionally there is no need for electrical contacts through a novel fiber-fiber fusion technique.

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