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Stress-activated Pyrolytic Carbon Nanofibers for Electrochemical Platforms

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ABSTRACT. Carbon's electrochemistry depends on its type and microstructure, and how these affect the electrode's electronic density of states. We demonstrate how pyrolysis of electro-mechanically stressed Polyacrylonitrile (PAN) nanofibers, infused with carbon nanotubes, will result in a unique graphitic electrode, which possesses enhanced and multifaceted electrochemical behavior. As corroborated by materials characterization, the microstructure of the stress-activated pyrolytic carbon (SAPC) characteristically contains a high proportion of disorders in the forms of edge planes and embedded heterogeneous nitrogen atoms. These disorders introduce a range of energy states near the Fermi level,