

## SUPPORTING INFORMATION

### **Structural and Electrochemical Properties of Musa acuminata Fiber Derived Hard Carbon as Anodes of Sodium-Ion batteries**

Meenatchi Thenappan<sup>1</sup>, Kouthaman Mathiyalagan<sup>1</sup>, Mozaffar Abdollahifar<sup>2,3,\*</sup>, Subadevi Rengapillai<sup>1,\*</sup> and Sivakumar Marimuthu<sup>1,\*</sup>

<sup>1</sup> #120, Energy Materials Lab, Department of Physics, Science Block, Alagappa University, Karaikudi-630003, Tamil Nadu, India.

<sup>2</sup> Institute for Particle Technology, Technische Universität Braunschweig, Volkmaroder Str. 5, 38104

Braunschweig, Germany.

<sup>3</sup> Battery LabFactory Braunschweig (BLB), Technische Universität Braunschweig, Langer Kamp 19, 38106

Braunschweig, Germany.

\* Correspondence: 1. m.abdollahifar@tu-braunschweig.de (Mozaffar Abdollahifar) Tel.: +49 531 391-94664

2. susiva73@yahoo.co.in & sivakumarm@alagappauniversity.ac.in (M.Sivakumar); Tel: +914565223304

3. susimsk@yahoo.co.in & subadevir@alagappauniversity.ac.in (R.Subadevi), Tel: +914565223306

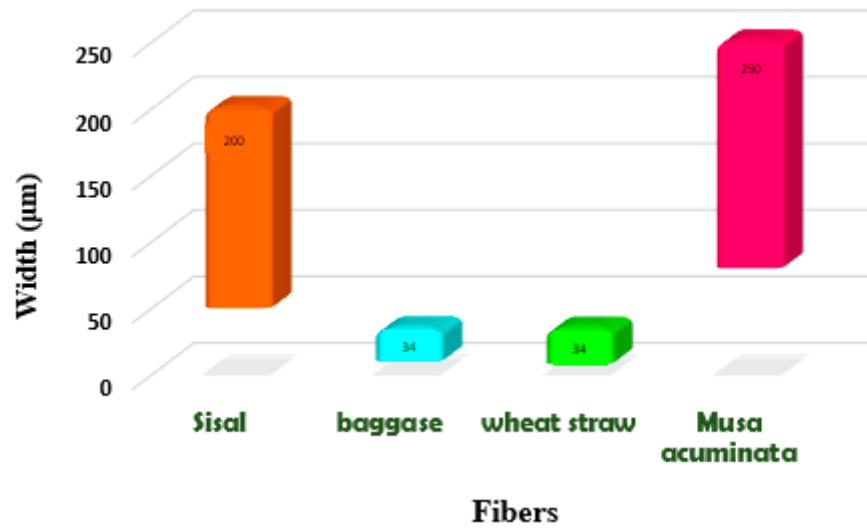


Figure S1: Bar graph for various Fibers and their Width

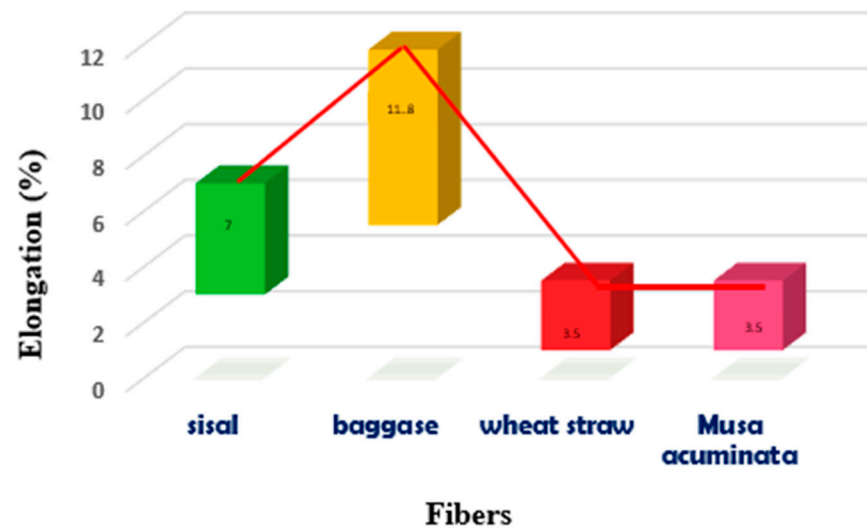


Figure S2: Bar Graph for various Fibers and their elongations

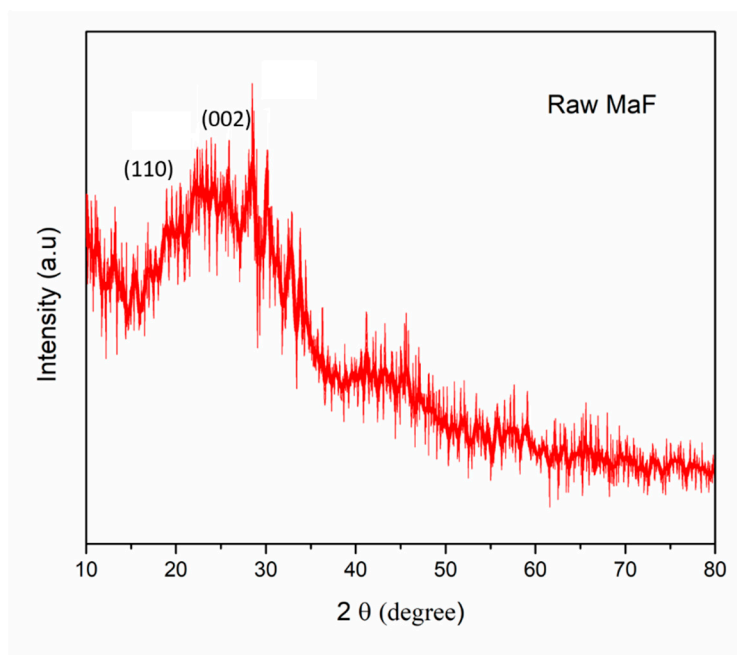


Figure S3: XRD Pattern of Raw MaF

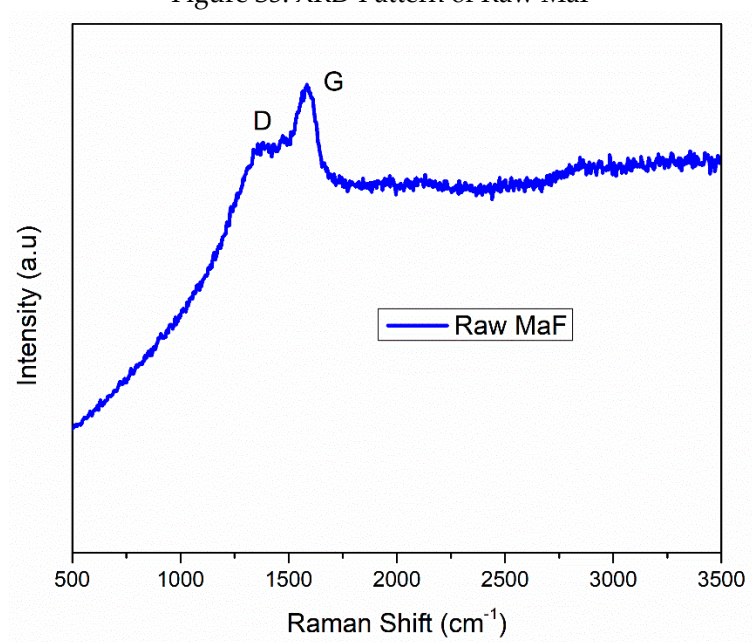


Figure S4: Raman spectra of Raw MaF

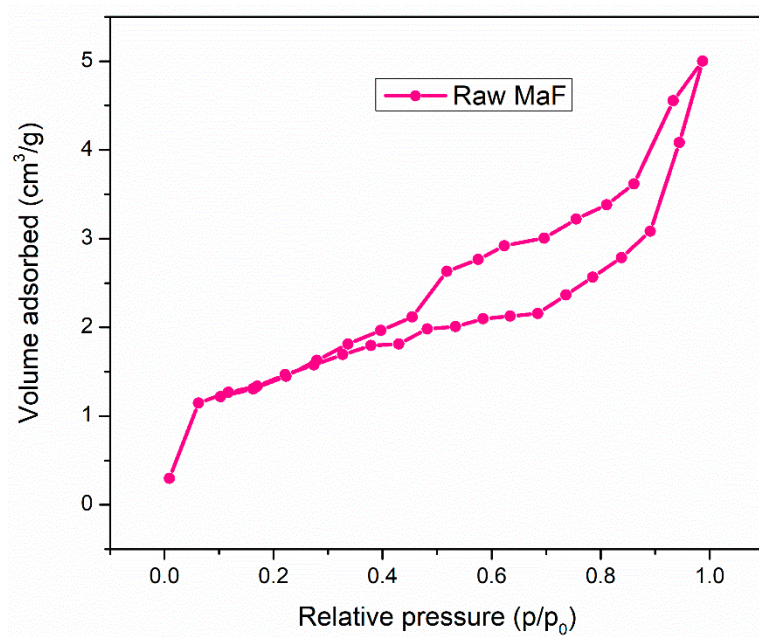


Figure S5: Nitrogen adsorption and Desorption of Raw MaF

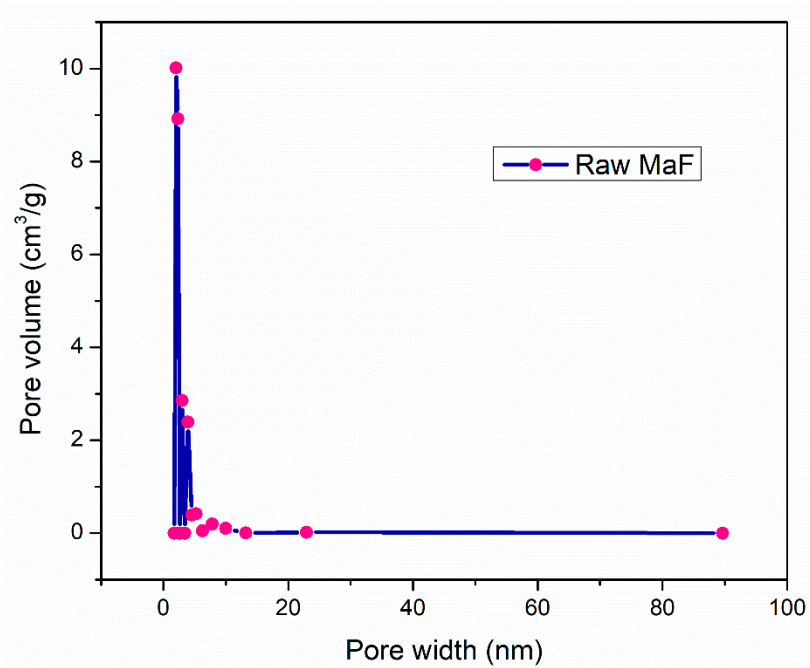


Figure S6: Pore size Distribution of Raw MaF

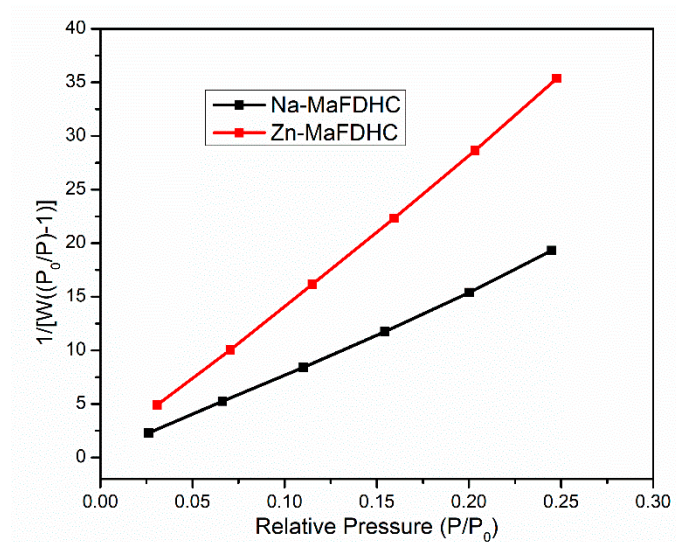


Figure S7: Nitrogen adsorption plot for Na-MaFDHC and Zn-MaFDHC

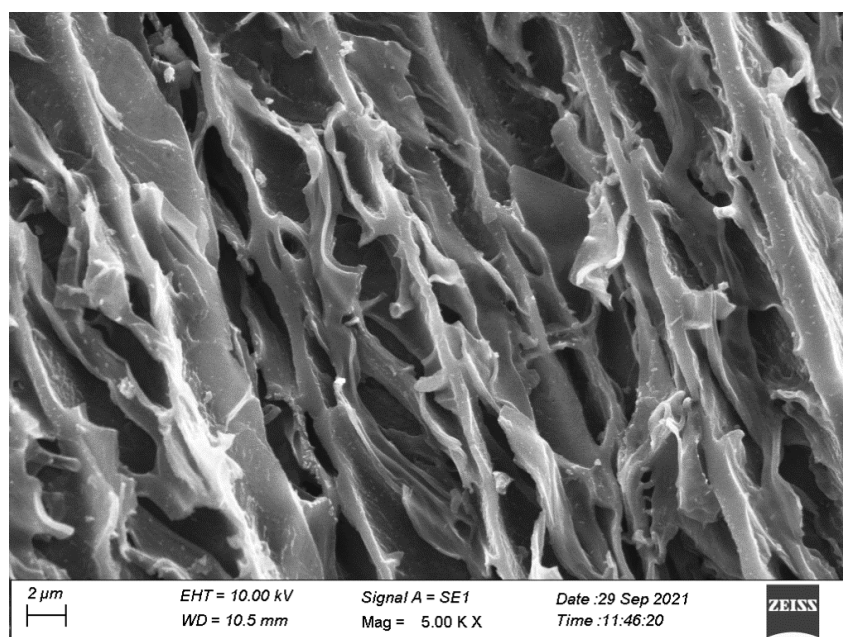


Figure S8: SEM image of Raw MaF



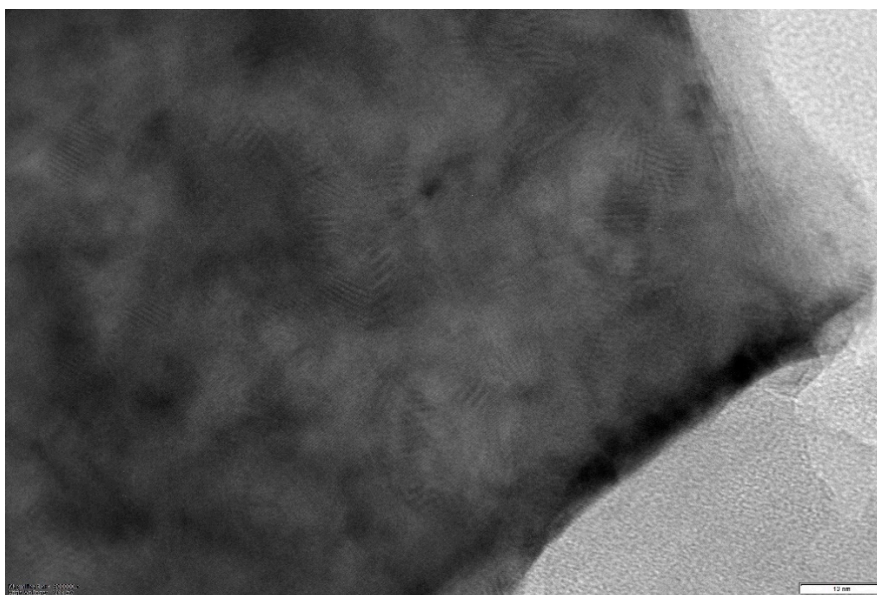


Figure S9: TEM image of Raw MaF

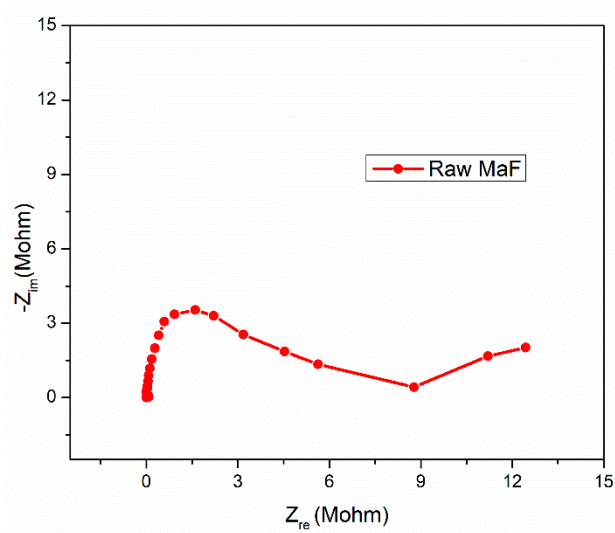


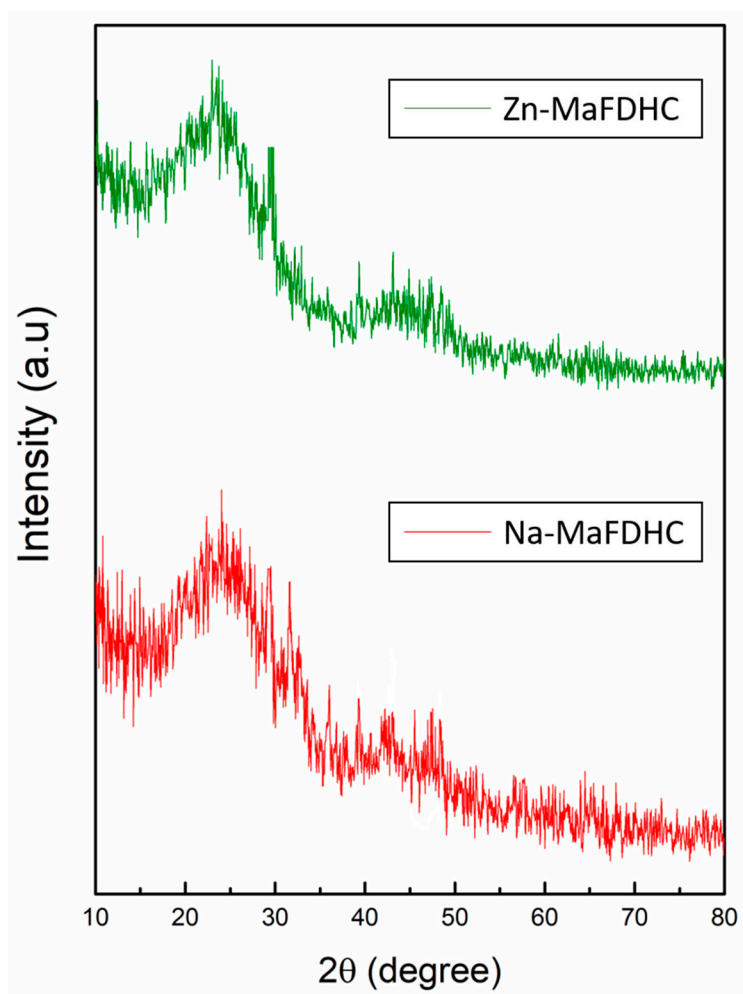
Figure S10: Nyquist plot of Raw MaF

**Table S1:** Physical property of natural fibers.

Sl. No	Fibers	Width in ( $\mu\text{m}$ )	Elongation in (%)
1	Sisal	50 - 200	03 - 07
2	Baggage	10 - 34	5.5 – 11.8
3	Wheat straw	08 - 34	1.0 – 3.5
4	Musa acuminata	80 - 250	1.0 – 3.5

**Table S2:** Sodium-ion Diffusion coefficient of MaFDHC.

Material	$R_s$ ( $\Omega$ )	$R_{CT}$ ( $\Omega$ )	$D_{Na^+}$ ( $cm^2 s^{-1}$ )
Zn-MaFDHC	27.5	263	$1.3 \times 10^{-15}$
Na-MaFDHC	47.76	327	$1.5 \times 10^{-15}$



**Figure S11:** XRD images of Na-MaFDHC and Zn-MaFDHC after 100 cycles