Electronic Supplementary Material (ESI) for RSC Advances.

Structural, dielectric and transport properties of $Na_xFe_{1/2}Mn_{1/2}O_2$ (x=1 and 2/3)

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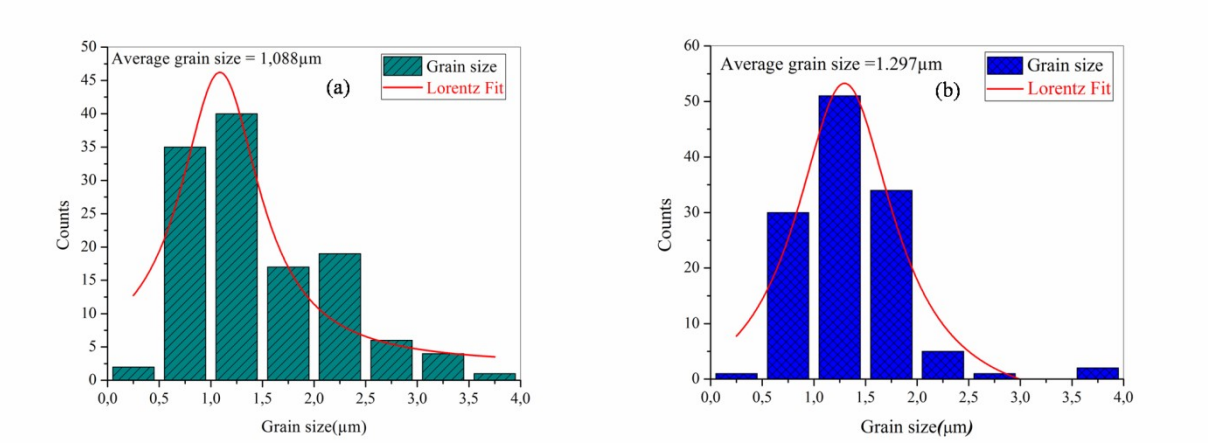

Fig. S1. The corresponding histograms for statistical calculation of the particle size for, (a) $NaFe_{1/2}Mn_{1/2}O_2$, (b) $Na_{2/3}Fe_{1/2}Mn_{1/2}O_2$.

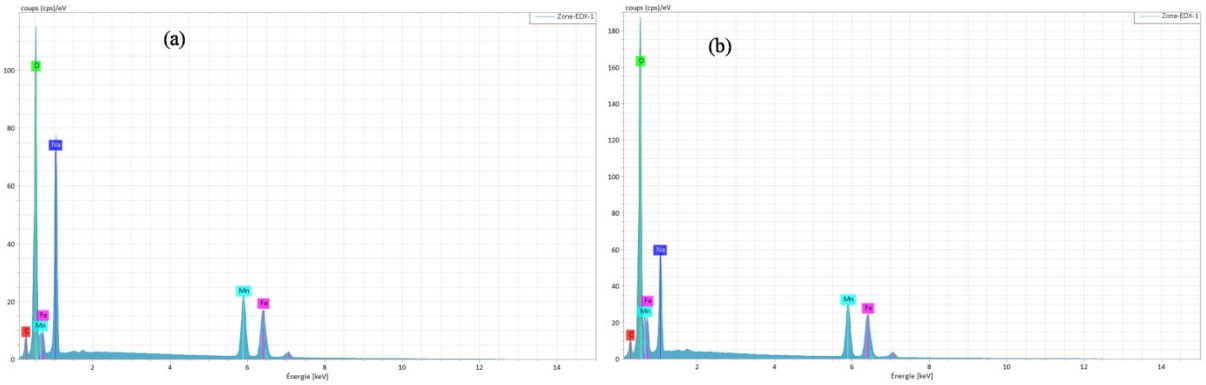

Fig. S2. Chemical analysis by EDX, Inset: grains size distribution for (a) $NaFe_{1/2}Mn_{1/2}O_2$, (b) $Na_{2/3}Fe_{1/2}Mn_{1/2}O_2$.

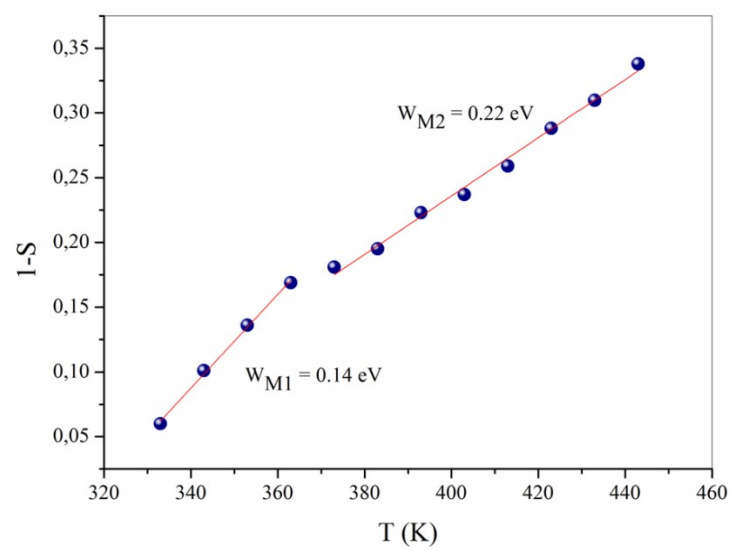

Fig. S3. Temperature dependence of 1 - s for the $NaFe_{1/2}Mn_{1/2}O_2$ compound.

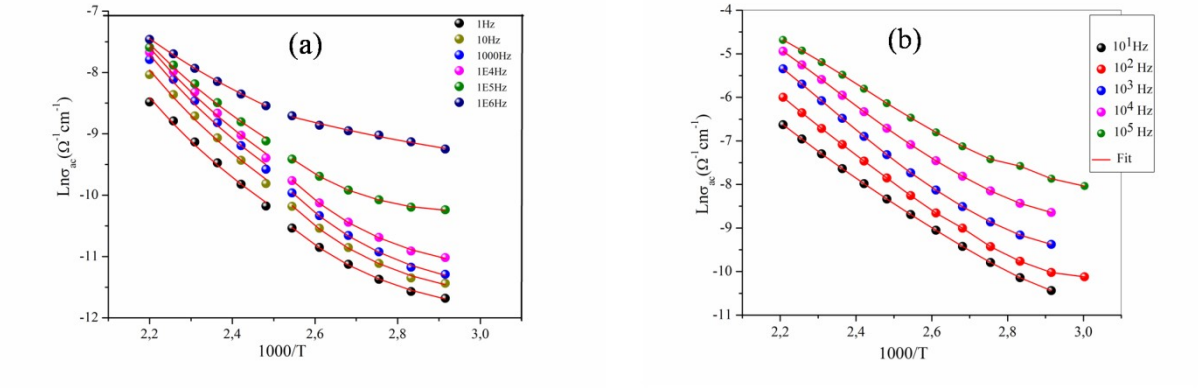

Fig. S4. Variation of Ln (σ_{ac}) with inverse of temperature at various frequencies (a) $NaFe_{1/2}Mn_{1/2}O_2$, (b) $Na_{2/3}Fe_{1/2}Mn_{1/2}O_2$.

Table S1: Fractional atom coordinates and isotopic atomic displacement parameters.

.$NaFe_{1/2}Mn_{1/2}O_2$

Atom	Wyck	x	y	z	O_{cc}	U_{iso} (Å^2)
O	6c	0	0	0.23		0.0215
Mn	3b	0	0	0.5	0.5	0.0156
Fe	3b	0	0	0.5	0.5	0.0156
Na	3a	0	0	0		0.0067
			$Na_{2/3}Fe_{1/2}Mn_{1/2}O_2$			
O	24l	0.3300	0.6618	0.0784		0.1175

Na(1)	12j	0.3312	0.6602	1/4	0.33	0.1967
Mn	2a	0	0	0	0.50	0.0440
Fe	2a	0	0	0	0.48	0.0693
Na(2)	2b	0	0	1/4	0.40	0.1111

Table. S2-a: Equivalent circuit elements (R and CPE) for the $NaFe_{1/2}Mn_{1/2}O_2$

T(K)	**R_g (Ω)**	**CPE_g (nF)**	α_g	**R_{bg} (Ω)**	**CPE_{bg} (** μF)	α_{bg}	**CPE_{el} (** μF)	α_{el}
333	2281	43.91	0.923	22756	881.05	0,65	0.23	0.587
343	1753	48.2	0.943	30418	931.26	0.648	0.26	0.505
353	1408	51.65	0.921	25916	834.53	0.664	0.32	0.398
363	1226	53.43	0.989	18178	689.35	0.691	0.37	0.338
373	1213	52.77	0.986	12822	703.87	0.7	0.42	0.326
383	1173	53.31	0.974	8406	898.06	0.69	0.52	0.316
393	975.3	60.9	0.952	5240	12.29	0.679	0.68	0.313
403	807.8	73.56	0.941	3246	17.25	0.665	0.94	0.319
413	635.5	94.36	0.991	1979	22.89	0.657	0.013	0.331
423	497.6	1.216	0.929	1186	28.53	0.659	0.018	0.343
433	384.9	1.697	0.954	684.3	34.10	0.670	0.024	0.355
443	295.9	2.452	0.969	366	42.93	0.690	0.034	0.366
453	179.2	3.619	0.972	225.3	53.20	0.729	0.046	0.377

Table S2-b: Equivalent circuit elements (R and CPE) for the $Na_{2/3}Fe_{1/2}Mn_{1/2}O_2$.

T(K)	**R_g (Ω)**	**CPE_g (** μF)	α_g	**R_{bg} (Ω)**	**CPE_{bg} (** μF)	α_{bg}

333	8813	0.95	0.720	39262	0.101	0.341
343	7901	0.86	0.657	22701	7,629	0.374
353	7136	0.77	0.558	13539	0.77	0.387
363	4556	0.974	0.576	9360	0.974	0.38
373	2823	0.012	0.605	6728	0.184	0.365
383	2204	0.014	0.583	4480	0.306	0.354
393	2173	0.473	0.515	2538	0.011	0.355
403	751.6	0.636	0.473	2613	0.990	0.377
413	637.1	0.014	0.485	1795	0.014	0.329
423	530.3	0.01	0.601	1562	0.037	0.295
433	415.9	0.02	0.622	1236	0.063	0.293
443	376.7	0.03	0.587	838.5	0,001	0.308
453	312.4	0.05	0.568	561.2	0,0013	0.34

Table S3.a. Parameters found from CBH model single polaron for the compound $NaFe_{1/2}Mn_{1/2}O_2$

frequeny	**U_{eff} (eV)**	**N_t (m^{-3})**	**W_m (eV)**
10	-3.025	$2.74.10^{29}$	0.960
10^2	-3.499	$2.05.10^{27}$	0.932
10^3	-3.205	$1.34.10^{25}$	0.936
10^4	-3.552	$5.90.10^{23}$	0.931
10^5	-4.341	$4.13.10^{21}$	0.944
10^6	-0.251	$1.80.10^{24}$	1.655

Table S3.b. Parameters found from CBH model bipolaron for the compound $NaFe_{1/2}Mn_{1/2}O_2$

frequeny	N_t (m^{-3})	W_m (eV)
10	$1.42.10^{34}$	0.718
10^2	$1.84.10^{31}$	0.709
10^3	$3.84.10^{27}$	0.708
10^4	$1.58.10^{25}$	0.715
10^5	$1.50.10^{23}$	0.414
10^6	$1.93.10^{21}$	0.836

Table S4. Parameters found from the tunneling model for the compound $Na_{2/3}Fe_{1/2}Mn_{1/2}O_2$

Frequency (Hz)	N_T (m^{-3})	τ_0(10^{-20}s)	α ($Å^{-1}$)	W_{H0} (eV)	r_p (Å)
10	2.10^{28}	25.11	6.10^5	7.5	0.801
10^2	$2.785.10^{20}$	50.50	$1.217.10^9$	1.525	2.243
10^3	$7.860.10^{18}$	5.942	$1.533.10^8$	1.509	1.601
10^4	$9.395.10^{17}$	0.4434	$7.399.10^8$	1.522	4.484
10^5	$2.046.10^{15}$	0.4038	$2.792.10^7$	1.574	11.610