Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Electronic Supplementary Information for

Facile synthesis and selected characteristics of two-dimensional material composed of iron sulfide and magnesium-based hydroxide layers (tochilinite)

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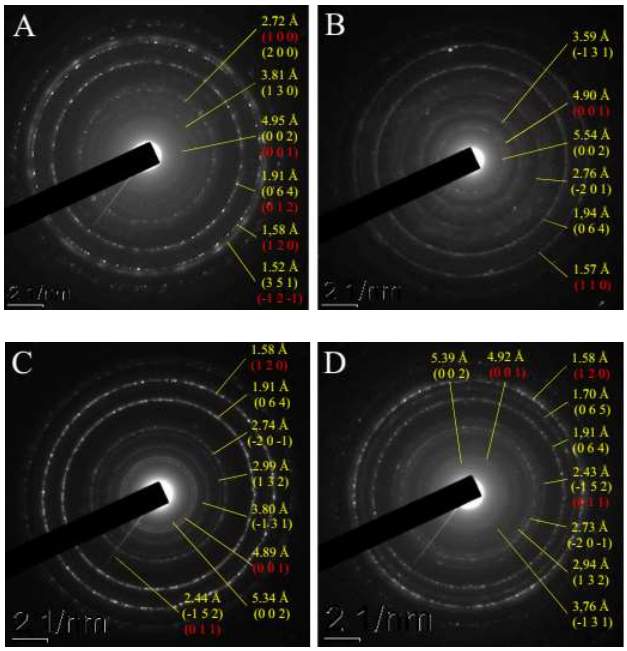


Fig. S1 Typical selected area electron diffraction patterns for the tochilinite samples synthesized using the atomic proportions of precursors (A) Fe 2, Mg 1.5, S 15, (B) Fe 2, Mg 1.5, S 15, Al 0.5, (C) Fe 2, Mg 1.5, S 15, Li 0.5, (D) Fe 2, Mg 1.5, S 15, Co 0.5. Reflections of brucite impurity are marked in red.

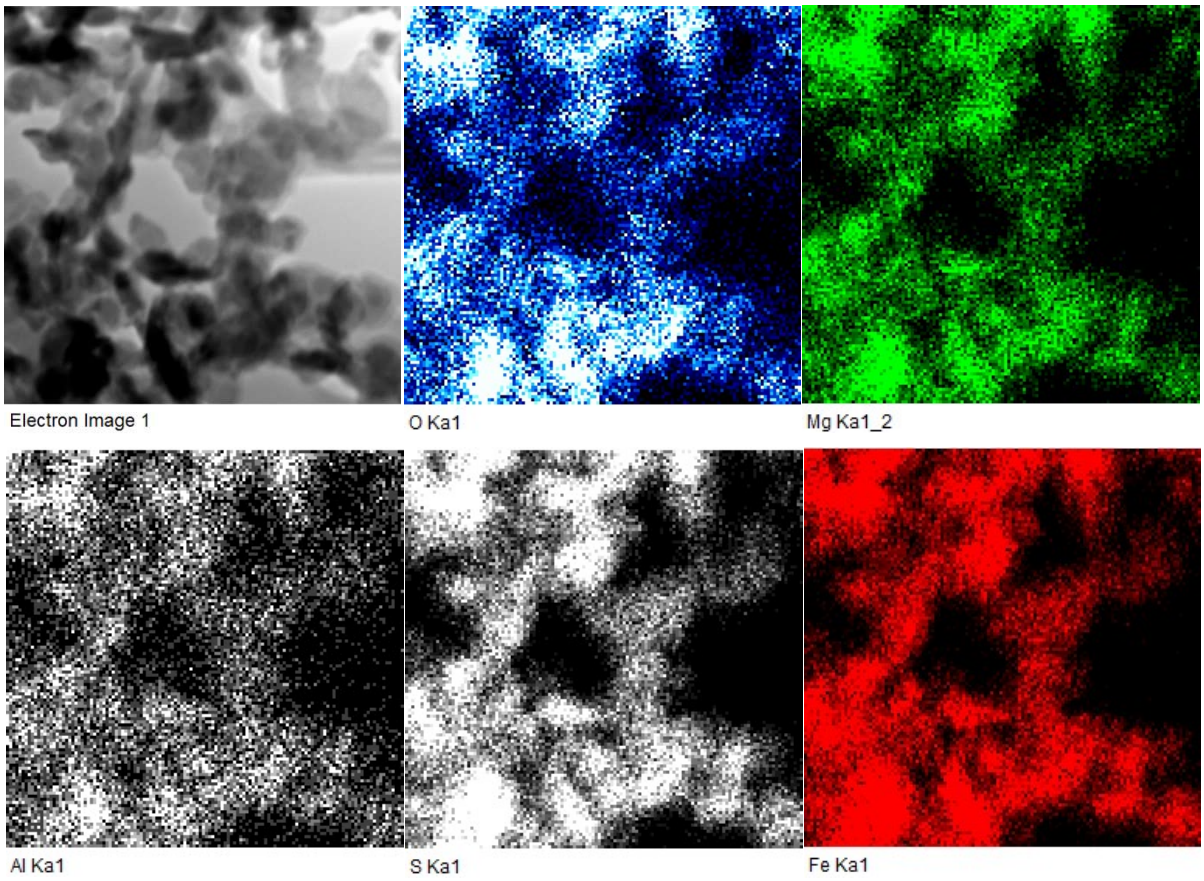


Fig. S2 STEM image and corresponding EDS elemental maps for tochilinite prepared with the atomic proportions of precursors Fe 2, Mg 1.7, S 15, Al 0.5.

Table S1 Surface concentrations of elements (at. %) as determined from XPS spectra at synthetic tochilinite samples* using the lines Fe 3p, S 2p, Mg 2s, O 1s, C 1s, Na 1s and Al 2s.

Sample	Fe	S	Mg	O	C	Na	Al
a	5.9	12.2	15.0	32.9	33.4	0.54	-
b	3.7	9.8	10.7	30.0	41.9	0.57	3.3
c	4.9	8.7	14.8	33.6	37.6	0.25	-
d	6.4	11.5	10.3	29.4	42.3	0.1	-

*initial atomic proportions of precursors (a) Fe 2, Mg 1.5, S 15, (b) Fe 2, Mg 1.5 Al 0.5, S 15, (c) Fe 2, Mg 1.5, Li 0.5, S 15, (d) Fe 2, Mg 1.7, S 3.

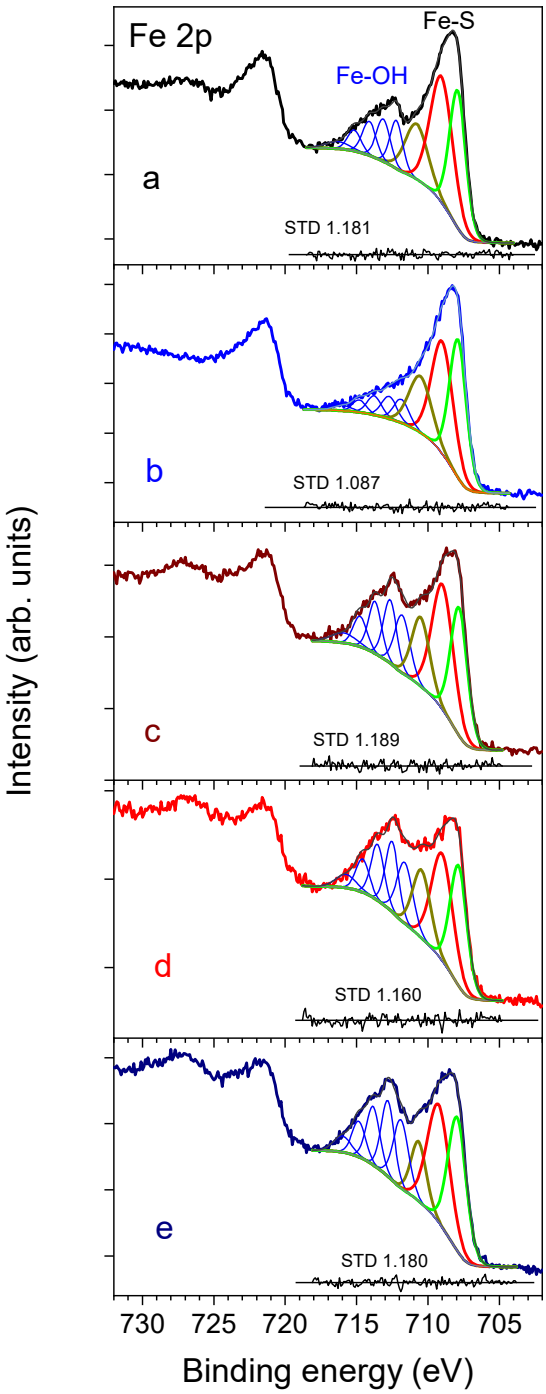


Fig. S3 Photoelectron Fe $2p_{3/2,1/2}$ of tochilinites synthesized using the atomic precursor proportions (a) Fe 2, Mg 1.5 S 15, (b) Fe 2 Mg 1.5 Al 0.5 S0.5, S 15, (c) Fe 2 Mg 1.5 Li 0.5, S 15, (d) Fe 2 Mg 1.5 Li 1.0, S 15, (e) Fe 2 Mg 1.7 S 3, with the low-energy region fitted using three Gaussian-Lorentzian peaks.

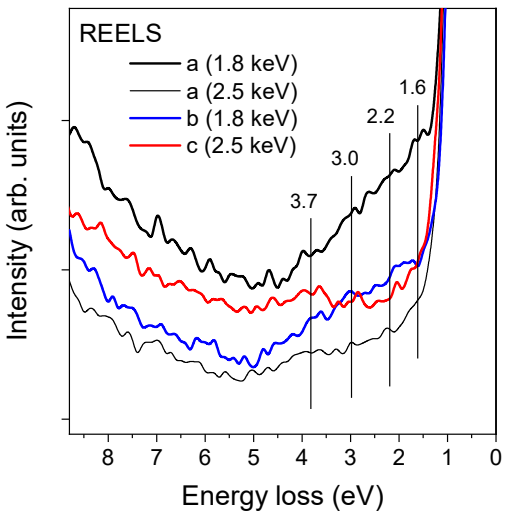


Fig. S4 REELS of tochilinites synthesized with the atomic proportions of precursors (a) Fe 2, Mg 1.5, S 15, (b) Fe 2, Mg 1.5 Al 0.5, S 15, (c) Fe 2, Mg 1.5, Li 0.5, S 15, (d) Fe 2, Mg 1.7, S 3. Values 1.8 keV and 2.5 keV in parentheses stand for energies of primary electrons.

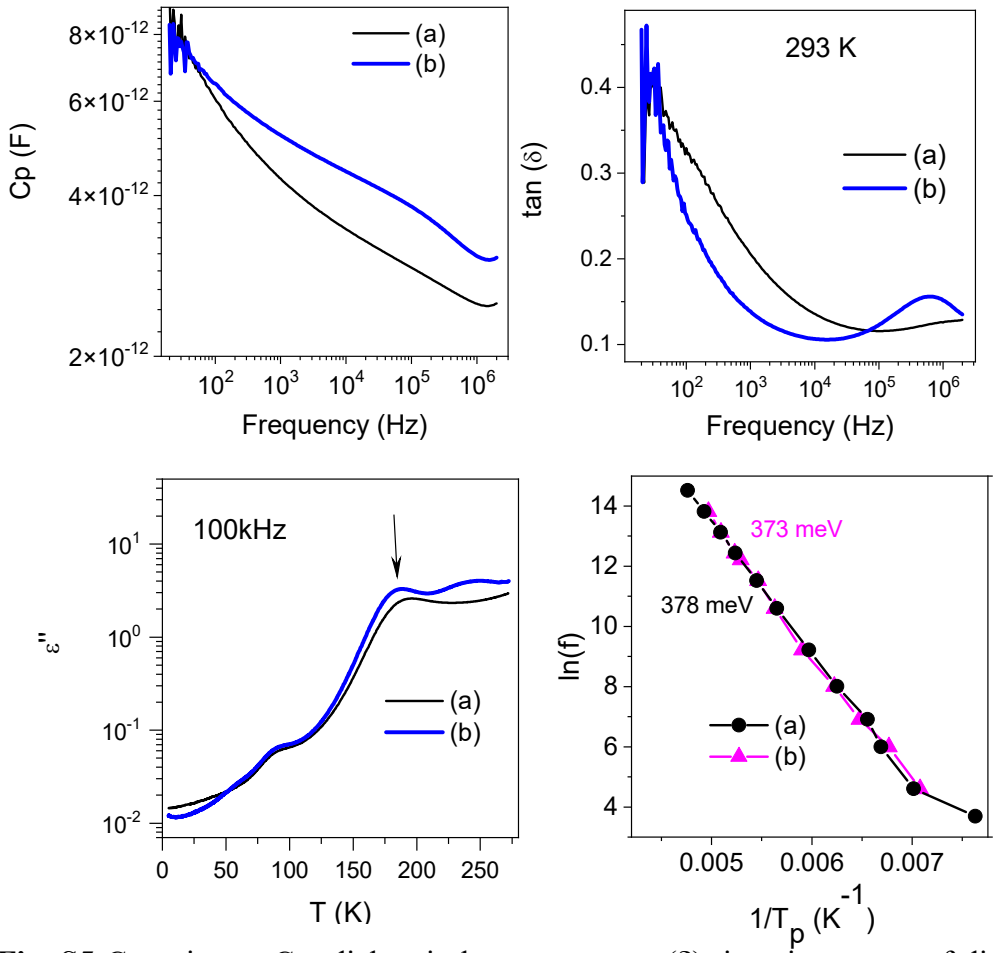
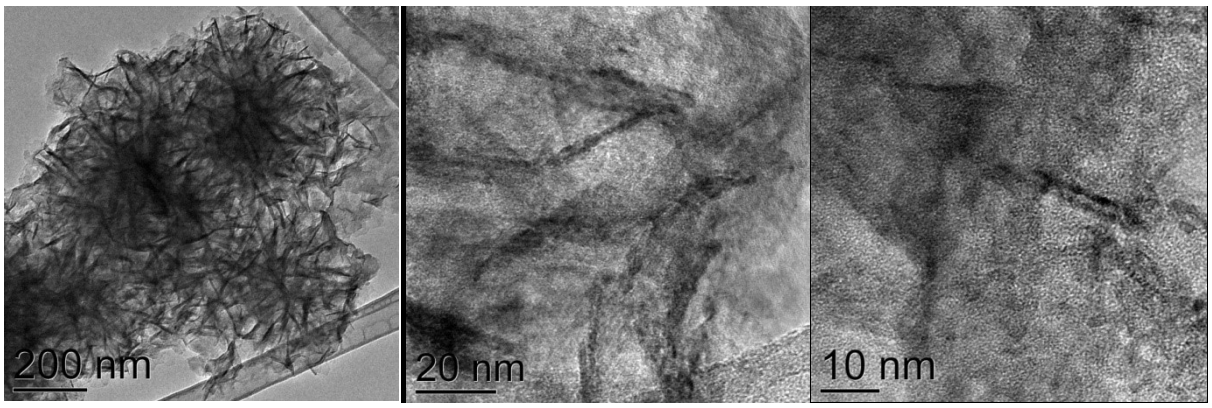
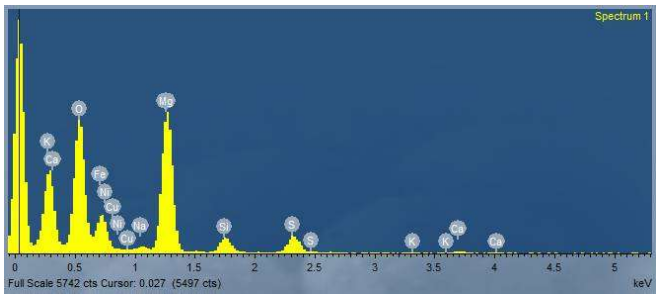


Fig. S5 Capacitance Cp, dielectric loss tangent tan(δ), imaginary part of dielectric permittivity ε``, and peak frequency ln(f) vs reciprocal temperature (Arrhenius plot) for tochilinites prepared with the atomic ratios of precursors (a) Fe 2, Mg 1.5, S 15 and (b) Fe 2, Mg 1.5, S 15, Al 0.5, measured using the tableted materials.





O *	Na	Mg	Si	S	K	Ca	Fe	Ni**	Cu**
55.32	0.87	25.2	2.2	2.4	0.09	0.19	8.9	4.0	0.73

*All the concentrations are in at. %

**Ni is due to Ni TEM grid, Cu appears due to the standard TEM retainer.

Fig. S6 TEM images, and EDS data acquired from the intermediary products formed at room temperature for the atomic proportion of reagents Fe 2, Mg 2, S 15.