Supporting Information for:

Mica Exfoliation through Liquid Ga embrittlement and the resulting CO_2 capture performance

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S1. EDS mapping and spectral images

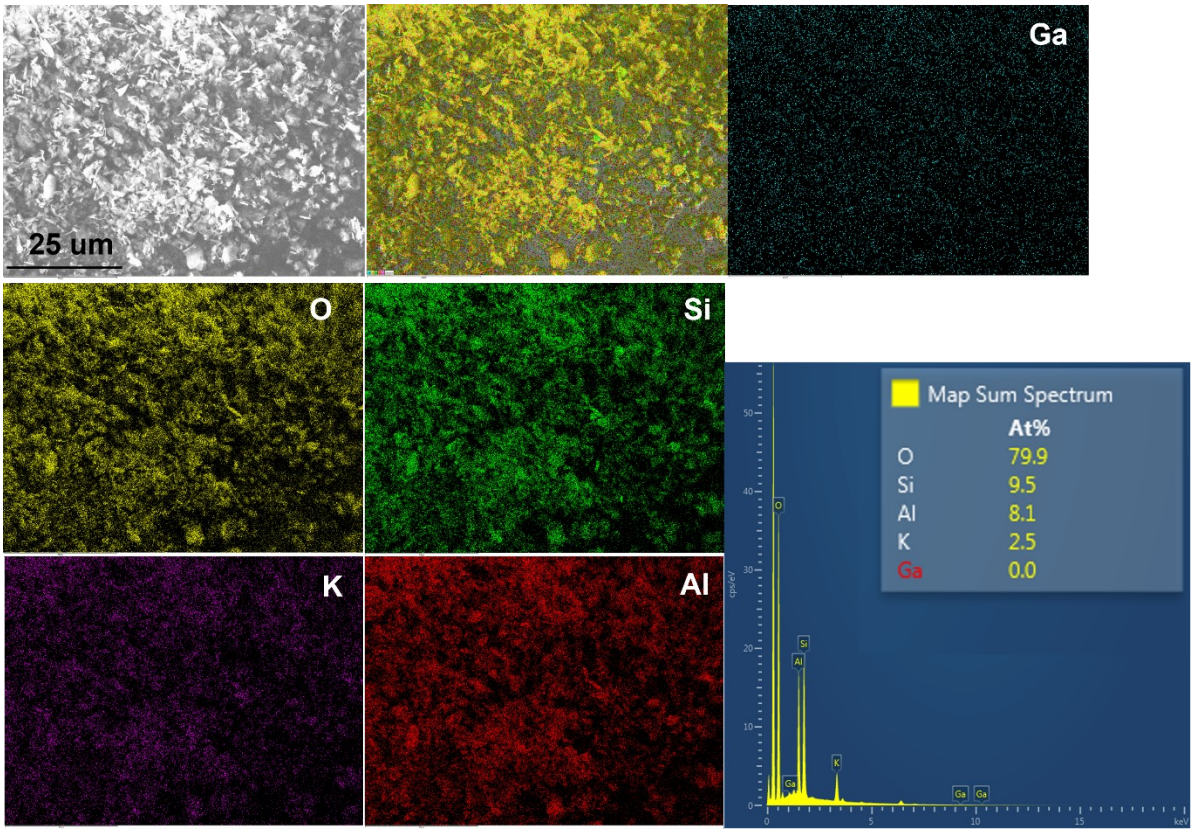

Figure S1. EDS mapping and spectral images for natural bulk mica.

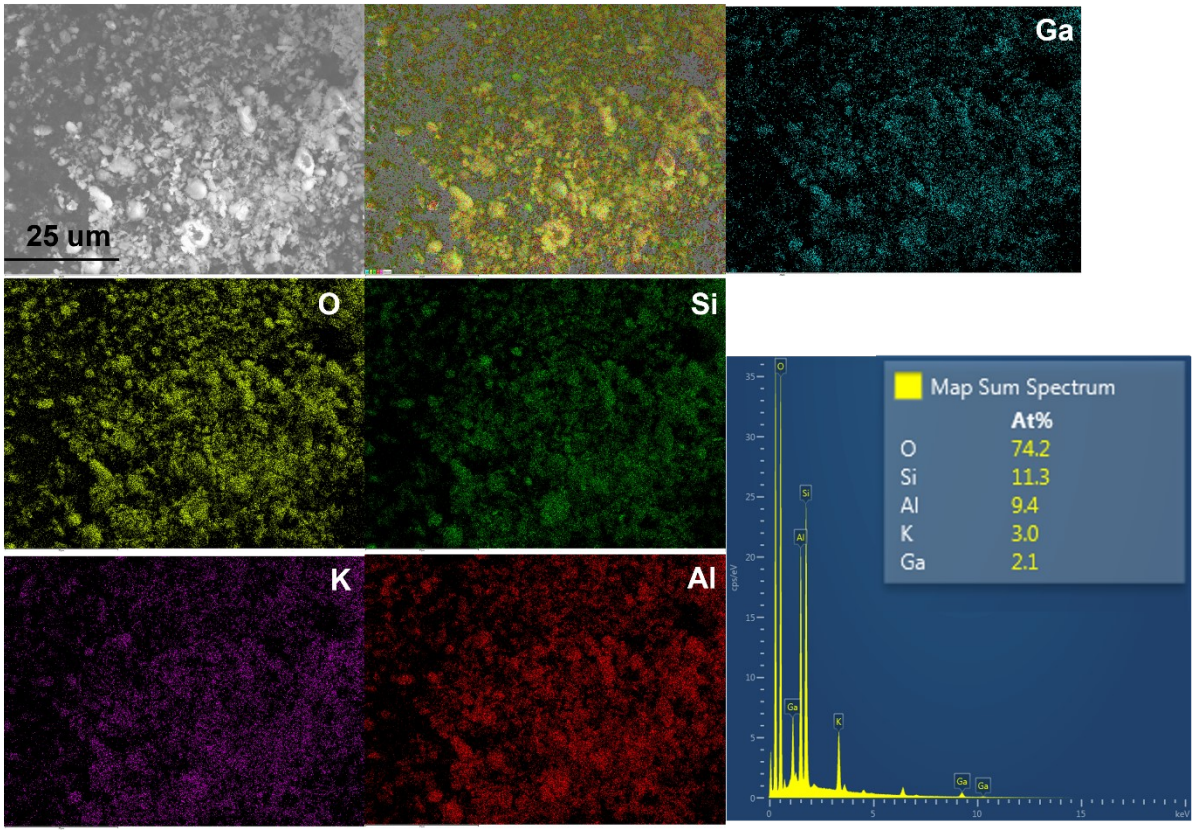

Figure S2. EDS mapping and spectral images for Emica.

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S2. A model for resistance of Ga deposited mica

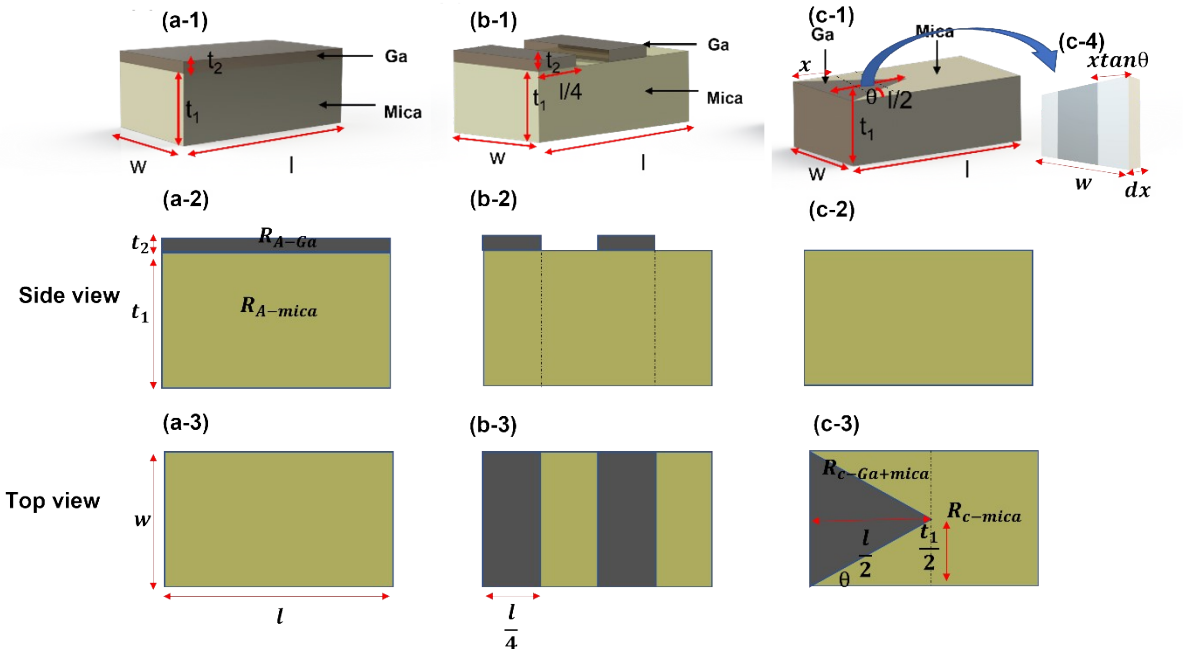

Figure S3. Schematic of (a-1) 3D view, (a-2) side view and (a-3) top view of Ga deposition as a continues thin film on the mica surface. (b-1) 3D view, (b-2) side view and (b-3) top view of Ga deposition as a discontinuous thin film on the mica surface. (c-1) 3D view, (c-2) side view and (c-3) top view of immersing Ga in between mica layers.

The resistance of mica piece R_{mica} can be expressed as

$$R_{mica} = \frac{\rho_1 l}{w t_1} \tag{1}$$

where ρ_1, l , w, t_1 are the resistivity, length, width, and thickness of the cuboid shaped mica sheet.

For continuous layer of Ga deposited mica as in Figure S3 (a), the resistance (R_a) can be obtained as in equation (4)

$$\frac{1}{R_a} = \frac{1}{R_{a-mica}} + \frac{1}{R_{a-Ga}} \tag{2}$$

$$\frac{1}{R_a} = \frac{wt_1}{\rho_1 l} + \frac{wt_2}{\rho_2 l} \tag{3}$$

$$R_a = \frac{l}{w}\left(\frac{t_1\rho_2 + \rho_1 t_2}{\rho_1\rho_2}\right) \tag{4}$$

where R_A, R_{A-mica}, R_{A-Ga}, t_2 and ρ_2 are resistance of Ga/mica composite with the continuous Ga layer, resistance of mica layer, resistance of Ga layer, thickness of Ga layer and resistivity of Ga layer, respectively.

For continuous layer of Ga deposited mica as in Figure S3 (b), the resistance (R_b) can be obtained as in equation (6).

$$R_b = 2\left(\frac{R_a}{4}\right) + 2\left(\frac{R_{mica}}{4}\right) \tag{5}$$

$$R_b = \frac{l\rho_1\rho_2}{2w(\rho_2 t_1 + \rho_1 t_2)} + \frac{\rho_1 l}{2wt_1} \tag{6}$$

For Ga immersed in between mica layers as in Figure S3 (c), the resistance (R_c) can be obtained as in equation (6)

$$\frac{1}{dR_{c-Ga+\ mica}} = \frac{2t_1 x tan\theta}{\rho_1 dx} + \frac{(w-2tan\theta)t_1}{\rho_2 dx} \tag{7}$$

$$dR_{c-Ga+ica} = \frac{\rho_1\rho_2 dx}{t_1[2x\rho_2 tan\theta + (w-2tan\theta)\rho_1]} \tag{8}$$

$$dR_{c-Ga+mica} = \frac{\rho_1\rho_2}{t_1}.\frac{dx}{w\rho_1 - 2tan\theta(\rho_{1\_}\rho_2)x} \tag{9}$$

Substitute tanθ= $\frac{t_1}{l}$

$$R_{c-Ga+mica} = \frac{\rho_1\rho_2}{t_1}.\frac{dx}{w\rho_1 - 2tan\theta(\rho_{1\_}\rho_2)x} + \frac{\rho_1 l}{2wt_1} \tag{10}$$

$$R_{c-Ga+mica} = \int_0^{\frac{l}{2}} \frac{l}{2}.\frac{\rho_1\rho_2}{t_1 w}.\frac{dx}{\frac{l}{2}\rho_1 - (\rho_{1\_}\rho_2)x} + \frac{\rho_1 l}{2wt_1} \tag{11}$$

$$R_c = R_{c-Ga+mica} + R_{c-mica} \tag{12}$$

$$R_c = \frac{l}{2}.\frac{\rho_1\rho_2}{t_1 w}.\frac{l}{2}.0\left\{\frac{ln|\frac{1}{2}\rho_1 - (\rho_{1\_}\rho_2)x|}{-(\rho_{1\_}\rho_2)}\right\} + \frac{\rho_1 l}{2wt_1} \tag{13}$$

$$R_c = \frac{l\rho_1\rho_2}{2wt_1(\rho_1-\rho_2)w}\ln\left(\frac{\rho_1}{\rho_2}\right) + \frac{\rho_1 l}{2wt_1} \tag{14}$$

S3. Selectivity of CO_2 from N_2

As shown in Figure S4, the adsorption of N_2 is ~1.47 wt.% while adsorption of CO_2 is 4.45% for exfoliated Ga/mica nanosheets.

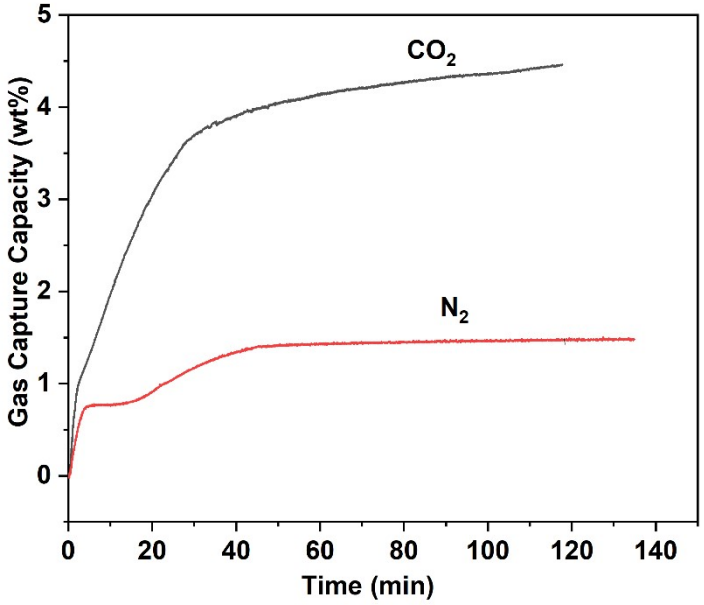

Figure S4: (a) Selective separation of CO_2/N_2 isotherms for exfoliated Ga/mica nanosheets.