Supplementary Information

Imprinted MoS$_2$ achieving high-efficient self-separative molecule extraction

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Supplementary Information S1:

![Imprinting in animals: a) ducklings on Corgi, b) new-hatched ducks on hen, and c) wolf cub on Rottweiler.](image)

**Figure S1.** Imprinting in animals: a) ducklings on Corgi, b) new-hatched ducks on hen, and c) wolf cub on Rottweiler.

Log in the websites below for more detailed information about imprinting in animals:


Supplementary Information S2:

Sips model which shares both attributes of Langmuir and Freundlich models is defined as follow:
\[ q_e = \frac{q_m K_s C_e^{n_s}}{1 + K_s C_e^{n_s}} \]  \hspace{1cm} (1)

Here, \( q_m \) is the maximum adsorption capacity, \( q_e \) is the equilibrium adsorption capacity, \( C_e \) is the equilibrium concentration, \( K_s \) is the Sips isotherm constant related to the energy of adsorption, and \( n_s \) is the sorbent surface heterogeneity parameter. If the value of \( n_s \) is unity, the Sips model describes the typical Langmuir adsorption behavior, otherwise the Sips model reflects a complex multilayer adsorption (\( n_s \) not equal to unity). Optionally, as the value of \( C_e \) or \( K_s \) approaches zero, the Sips isotherm describes Freundlich isotherm behavior.

**Figure S2.** Xps spectra of pristine MoS\(_2\) (red line), MoS\(_2\) with adsorbed RhB (black line), and MoS\(_2\) with adsorbed LA (blue line): a) Element scanning, b) Mo 3d, and c) S 2p.
Figure S3. SEM image of as-prepared flower-like MoS$_2$. 
**Figure S4.** HRTEM of the (a) edge and (b) plane of MoS$_2$ nanosheet, and (c) Mo and S element mapping on MoS$_2$ edge.

**Figure S5.** Water contact angle (WCA) test of n-hexane- (top graph) and water-imprinted MoS$_2$ (bottom graph) versus time.

**Figure S6.** $^1$H solid-state MAS NMR spectra of pristine, water- and n-hexane-imprinted MoS$_2$. 
**Figure S7.** Recycling ability of imprinted MoS$_2$ for heterophasic adsorption.

**Figure S8.** Imprinted MoS$_2$ d) wrapped by water droplet submerged in n-hexane and e) wrapped by n-hexane droplet submerged in water.
Figure S9. Fourier transformed infrared spectra (FTIR) of lauric acid (LA), LA adsorbed by MoS$_2$ in monophase (both MoS$_2$ and LA in n-hexane) and heterophase (MoS$_2$ in water but LA in n-hexane).

Figure S10 indicates that MoS$_2$ soaked by water and n-hexane have no change in its flower-like morphology, compared with as-prepared MoS$_2$.

Figure S10. SEM images of a) as-prepared MoS$_2$, b) water-soaked MoS$_2$, and c) n-hexane-soaked MoS$_2$. 