Supporting Information

Light-Emitting Ti$_2$N (MXene) Quantum Dots: Synthesis, Characterization and Theoretical Calculations

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Figure S2: Fluorescence of Ti$_2$N MQDs dispersed in water. The MQDs showed blue emission when illuminated with UV (250 nm) LEDs.
**Figure S3:** A. PL-spectrum of Ti$_2$N MQDs solution (black) and thin film (red) at 375-nm laser excitation. B. Confocal image (scale bar = 5 µm) of thin-film Ti$_2$N MQDs at 405-nm laser excitation. C. Blank quartz substrate illuminated with UV (250 nm) LED. D. Thin-film Ti$_2$N MQDs drop casted on quartz substrate illuminated with UV (250 nm) LED.
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We further confirmed the light-emitting property and PL behavior of thin-film Ti$_2$N MQDs for comparison with the PL of the Ti$_2$N MQD solution using a 375 nm laser (Figure S3A). The PL showed a redshift of the peak position when the colloidal solution was changed to a solid-state. The PL confocal mapping of the thin film (Figure S3B) was performed using 405 nm laser excitation. The longer wavelength allowed proper observation of the PL of Ti$_2$N in solution. By illuminating the blank quartz substrate and thin-film Ti$_2$N MQDs using a UV (250 nm) LED, we demonstrated the light-emissive properties of the MQDs (Figures S3C and S3D).
Supporting note Figure S4: Measurement of Quantum Yield

We measured the absolute quantum yield (QY) of rhodamine 6G (R6G) solution in an integrating sphere and at different excitations using a commercial QY spectrometer. The PL and UV-Vis absorption of R6G and Ti$_2$N MQDs were measured under the same conditions, which were then compared to estimate the QY of the MQDs using Equation (1):  

$$\Phi_{MQD} = \Phi_{ref} \frac{I_{(MQD)}}{A_{(MQD)}} \frac{I_{(ref)}}{A_{(ref)}}$$  

(1)

where $\Phi_{MQD}$ and $\Phi_{ref}$ are the QY of the MQDs and reference sample, respectively. $I_{(MQD)}$ is the PL intensity of the MQDs, $I_{(ref)}$ is the PL intensity of the reference sample, and $A_{(MQD)}$ and $A_{(ref)}$ are the absorptions of the MQDs and reference sample, respectively. The QY (%) of Ti$_2$N were calculated within the range of 250 to 400 nm wavelength excitation. For this measurement, the R6G solution was used as the reference sample.
References
