

## Supporting Information

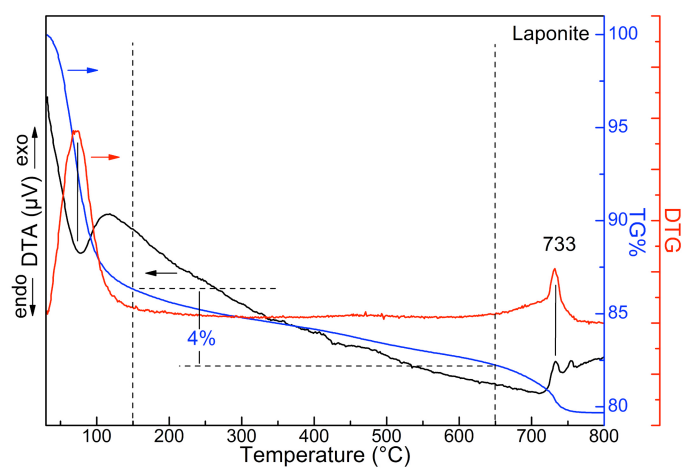
# Top-Down and Bottom-Up Approaches to Transparent, Flexible and Luminescent Nitrogen-Doped Carbon NanoDots-Clay Hybrid Film

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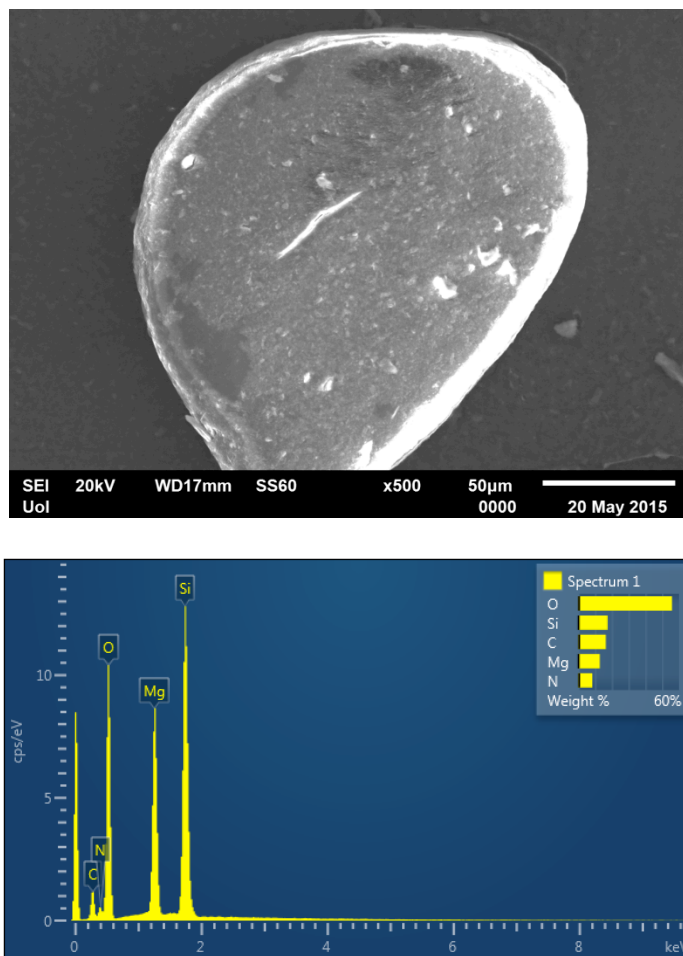
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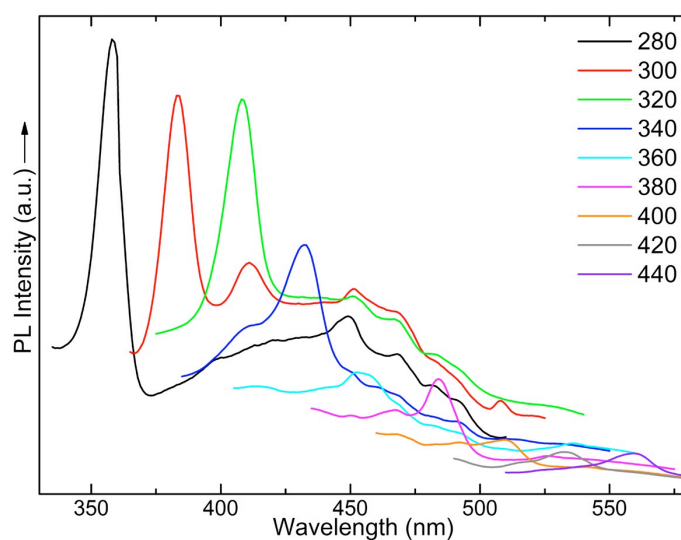
*Experimental details of additional analytical measurements presented in the supporting information:* Scanning electron microscopy (SEM) images were recorded using a JEOL SEM-6510LV scanning electron microscope equipped with an EDX analysis system xx-Act from Oxford Instruments.



**Figure S1.** Thermogravimetric (TG), differential thermogravimetric (DTG) and differential thermal (DT) analysis curves of Laponite<sup>®</sup>.

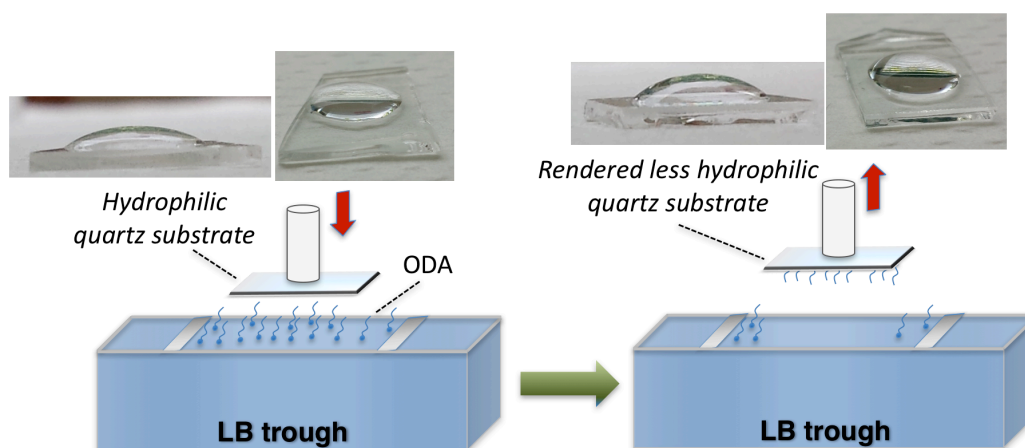


**Figure S2.** Scanning electron micrograph (top panel) and EDX spectrum (bottom panel) of a NCNDs-Lap hybrid prepared with the top-down approach.



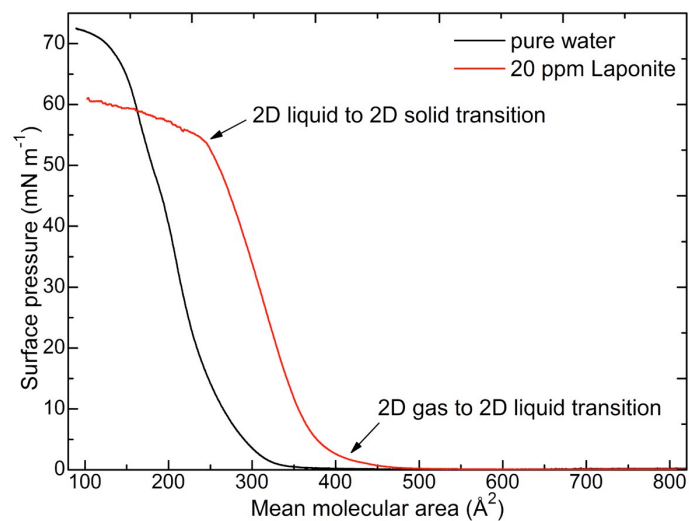
**Figure S3.** Extended photoluminescence emission (PL) spectra of a DODA-Lap-NCNDs multilayer film (80 layers) exhibiting additional emission bands.

*Preparation of less hydrophilic quartz:* The surface modification of hydrophilic quartz substrates was achieved by one-step Langmuir Schaefer (LS) deposition in a Langmuir Blodgett (LB) trough. Ultrapure water was used as subphase and an octadecylamine (ODA) solution ( $0.2 \text{ mg mL}^{-1}$ ) dissolved in chloroform/methanol 9/1(v/v) was spread onto the surface. The hydrophilic quartz was dipped horizontally (LS method) at a constant surface pressure of  $30 \text{ mN m}^{-1}$  as shown in **Scheme S1**. After the LS deposition, the quartz substrates were rinsed with pure water and dried with a flow of  $\text{N}_2$  gas.

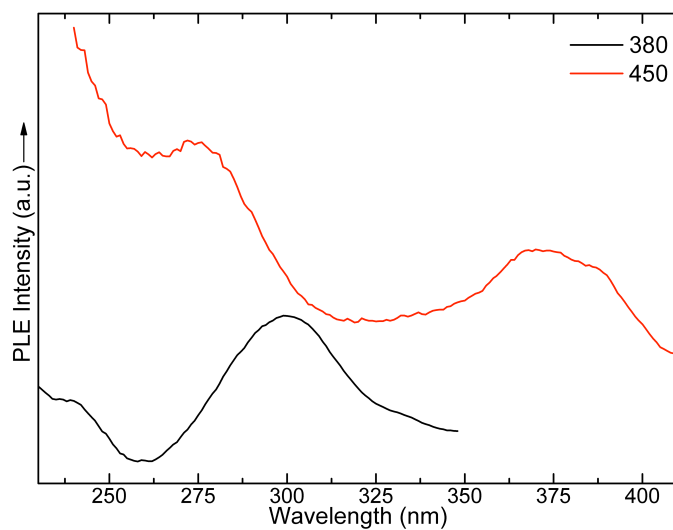


**Scheme S1.** Schematic representation of the surface modification of hydrophilic quartz substrates.

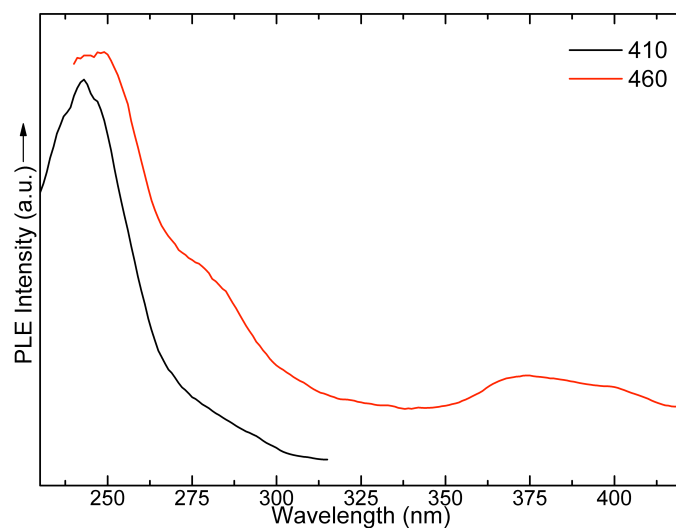
Pressure-area ( $\Pi$ - $a$ ) isotherms of DODA monolayers on pure water and on a laponite<sup>®</sup> dispersion are presented in **Figure S4**. The curves show the change in the slope corresponding to the phase transitions of DODA-laponite<sup>®</sup> sheets from two-dimensional gas to two-dimensional liquid and then to two-dimensional solid during the compression process.



**Figure S4.**  $\Pi$ - $a$  isotherms of DODA monolayers on pure water and on an aqueous dispersion of  $0.02 \text{ mg mL}^{-1}$  Laponite® acquired during compression.



**Figure S5.** Photoluminescence excitation (PLE) spectra of a NCNDs-Lap aqueous suspension.



**Figure S6.** Photoluminescence excitation (PLE) spectra of a DODA-Lap-NCNDs multilayer film on quartz (80 layers).