

Editorial

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Advance of the Modified $g\text{-C}_3\text{N}_4$ Materials by Doping WO_{3-x} ($X=0.1, 0.2, 0.3$)

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The non-stoichiometric tungsten oxide nanostructure, $\text{WO}_{2.9}$ ($\text{W}_{25}\text{O}_{73}$, dark blue color) is an efficient electrocatalyst for hydrogen evolution in acidic water, which has shown promise as an alternative to platinum (Nature Communications 2015, 6, 8064(1-7)). Generally speaking, the oxygen vacancies or oxygen deficiencies can affect the electronic band structure and enhance the conductivity. Blue tungsten oxide-based materials, $\text{WO}_{2.8}$ (W_5O_{14}) are used as promising anode materials for lithium-ion batteries (Adv. Funct.

Mater. 2018, 28, 1707500). And sea urchin-like $\text{WO}_{2.7}$ ($\text{W}_{18}\text{O}_{49}$, purple color) nanowire can be used as a substrate material to magnify the substrate-analyte molecule interaction, leading to significant SERS response, even comparable to noble metals without 'hot spots' (Nature Communications 2015, 6, 7800(1-7)). The extremely high electrocatalytic activity and SERS response can probably be attributed to the presence of oxygen deficiencies, either intrinsic or on the surface (Nature Communications 2015, 6, 7800(1-7)).

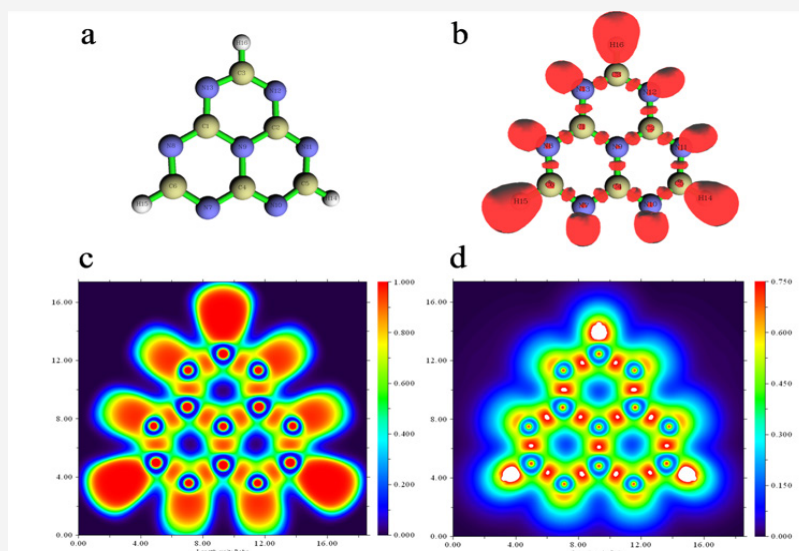


Figure 1 : Schematic illustration of the minimum structural unit of $g\text{-C}_3\text{N}_4$ (a) and the corresponding isometric surface of electron localization function (ELF) (b), Color-filled maps of ELF (c) and localized orbital locator (LOL) (d), respectively.

As shown in Figure 1, our group have drawn the color-filled maps of electron localization function and localized orbital locator. Chemical bonds, electronic clouds and lone pairs of electrons of $g\text{-C}_3\text{N}_4$ structure can be clearly seen. Based on our past work of the

preparation and modification of $g\text{-C}_3\text{N}_4$ and their SERS sensing, photo/electro-catalytic applications (Carbon 2018, 130, 652-663; Carbon 2015, 87, 193-205; Carbon 2014, 80, 213-221; Applied Surface Science 2019, 467-468, 608-618; Catalysis Letters 2018,

148, 3342-3348; Applied Surface Science 2018, 430, 362-370; Materials Letters 2018, 212, 288-291; Scientific Reports 2016, 6, 34599(1-10); RSC Advances 2016, 6, 47368-47372), we expect that there will be a very strong electro-catalytic and optical performance based on the modified g-C₃N₄ materials by doping WO_{2.9}, WO_{2.8} or WO_{2.7}. From the perspective of the experimental and DFT calculation, we are investigating the electron transfer of WO_x

coordinated g-C₃N₄ and the catalytic performance of this kind of heterojunctions with oxygen deficiencies (Figure 1).

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Conflict of Interest

No Conflict of Interest.