FESE 不同气候区腐殖酸和富里酸对紫外线辐照氧化石墨烯团聚行为的影响

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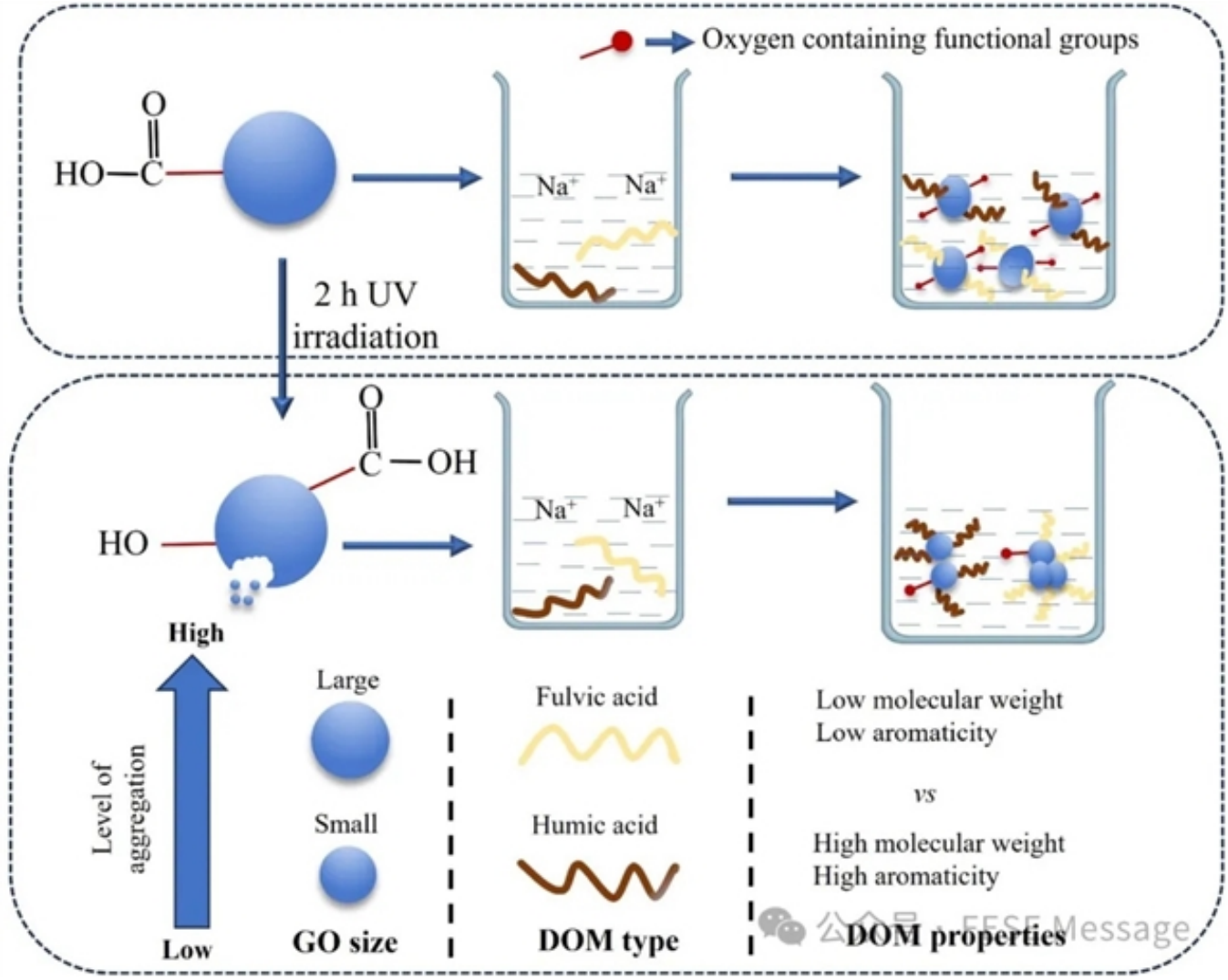
第五届FESE青年论坛

时间	日程
5 月 23 日	报到
5 月 24 日上午	开幕式 博学笃行•前沿主旨报告
5 月 24 日下午	格物致知•青年思辨论坛 包括化学、地学、交叉、生物分论坛
5 月 25 日上午	正心明志•青年发展沙龙 闭幕式

会议详情：第五届FESE青年论坛开放注册



摘要图

水体系统对紫外线的吸收会影响氧化石墨烯（GO）纳米颗粒的物理化学特性，最终影响其在水中的团聚行为。本研究从中国不同气候带提取的多种腐殖酸和富里酸（HA/FA），分别与在200 mmol/L NaCl溶液中经2小时紫外线照射的大尺寸（约500nm）和小尺寸（约200nm）的GO进行处理。结果显示，经紫外线照射的GO颗粒，即使在腐殖酸/富里酸（HA/FA）低浓度（0.2-1.0mgC/L）时也会发生团聚，而未处理的GO颗粒则未出现此类行为。这种团聚现象归因于紫外辐照导致含氧官能团（C=O/C－O）的减少，从而使GO转化为还原氧化石墨烯（rGO）。因此，rGO表现出较低的分散性，促进了其团聚。此外，由于腐殖酸（HAs）的分子量较大且极性较高，大小尺寸的GO颗粒在腐殖酸中的团聚程度均比在富里酸（FAs）中低。来自高原山地气候区的马口富里酸（Makou FA）和亚热带季风气候区的玛沁腐殖酸（Maqin HA）更显著地促进了GO的团聚，这归因于溶解性有机质（DOM）的分子量较低且芳香性较弱，降低了其吸附能力。应用Derjaguin-Landau-Verwey-Overbeek（DLVO）理论分析表明，即使在DOM存在的情况下，2小时紫外辐照后的GO颗粒之间也未显示出显著的相互作用能垒，这表明尽管添加了DOM，团聚现象仍然占主导地位。这些发现表明，紫外辐照对GO对水体环境中GO的稳定性构成了重大威胁，尤其是在DOM存在的情况下。

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RESEARCH ARTICLE

Effect of different climate zone's humic and fulvic acid on aggregation of UV irradiated graphene oxide

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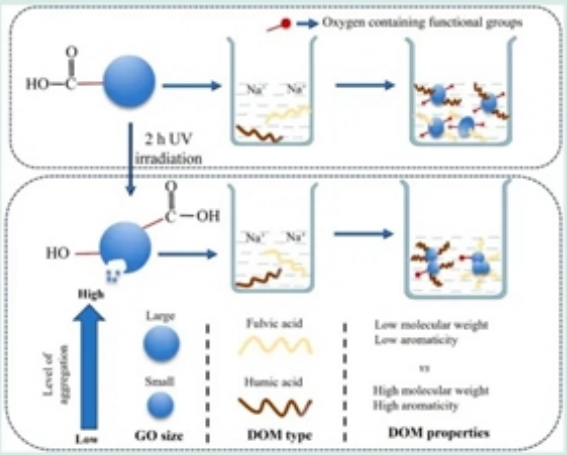
HIGHLIGHTS

- GO converted to rGO with less hydrophilicity after 2 h UV irradiation.
- UV irradiated GO aggregated more with different climate zone's FA than HA.
- Physicochemical properties of HA/FA had obvious effect on UV-aged GO aggregation.
- C–C/C=C and C–O functional groups involved in GO's stability/aggregation.



ABSTRACT: UV light absorption by aquatic systems affect the physicochemical characteristics of graphene oxide (GO) nanoparticles which ultimately influence its aggregation behavior in water. Regarding this research, various humic and fulvic acids (HA/FA), extracted from China's different climate zones, were treated with 2 h UV irradiated large (~500 nm) and (~200 nm) GO in 200 mmol/L NaCl. UV irradiated GO particles displayed aggregation even at low humic acid/fulvic acid (HA/FA) concentrations ranging from 0.2 to 1.0 mgC/L, whereas pristine GO particles did not exhibit such behavior. Reduction of functional groups, containing Oxygen (C=O/C–O), via UV irradiation is responsible for this aggregation phenomenon and conversion of GO to reduced graphene oxide (rGO). Consequently, rGO exhibits lower dispersibility, facilitating its agglomeration. Moreover, both small and large-sized GO particles exhibited less aggregation in HAs compared to FAs due to large molecular weight and high polarity of HAs. Aggregation of GO was more obvious with Makou FA and Maqin HA from Plateau and Mountain climate zone and Subtropical Monsoon climate zone, respectively, owing to

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oxide。通讯作者为北京师范大学的李阳教授。

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