Title:	Light-Induced Hypoxia in Carbon Quantum Dots and Ultrahigh Photocatalytic Efficiency
Authors:	Mondal, Sanjit (/jspui/browse?type=author&value=Mondal%2C+Sanjit) Sahoo, Lipipuspa (/jspui/browse?type=author&value=Sahoo%2C+Lipipuspa) Dutta, Sudipta (/jspui/browse?type=author&value=Dutta%2C+Sudipta) Gautam, Ujjal K. (/jspui/browse?type=author&value=Gautam%2C+Ujjal+K.)
Keywords:	Oxidation reactions Quantum dots Oxygen
Issue Date:	2022
Publisher:	ACS Publications
Citation:	Journal of the American Chemical Society, 144(6), 2580-2589
Abstract:	Carbon quantum dots (CQDs) represent a class of carbon materials exhibiting photoresponse and many potential applications. Here, we present a unique property that dissolved CQDs capture large amounts of molecular oxygen from the air, the quantity of which can be controlled by light irradiation. The O2 content can be varied between a remarkable 1 wt % of the CQDs in the dark to nearly half of it under illumination, in a reversible manner. Moreover, O2 depletion enhances away from the air–solution interface as the nearby CQDs quickly regain them from the air, creating a pronounced concentration gradient in the solution. We elucidate the role of the CQD functional groups and show that excitons generated under light are responsible for their tunable adsorbed-oxygen content. Because of O2 enrichment, the photocatalytic efficiency of the CQDs toward oxidation of benzylamines in the air is the same as under oxygen flow and far higher than the existing photocatalysts. The findings should encourage the development of a new class of oxygen-enricher materials and air as a sustainable oxidant in chemical transformations.
Description:	Only IISERM authors are available in the record
URI:	https://doi.org/10.1021/jacs.1c10636 (https://doi.org/10.1021/jacs.1c10636) http://hdl.handle.net/123456789/4669 (http://hdl.handle.net/123456789/4669)
Appears in Collections:	Research Articles (/jspui/handle/123456789/9)

Files in This Item:

File	Description	Size	Format	
Need To Add…Full Text_PDF. (/jspui/bitstream/123456789/4669/1/Need%20To%20Add%e2%80%a6Full%20Text_PDF.)		15.36 kB	Unknown	View/Open (/jspui/l

Show full item record (/jspui/handle/123456789/4669?mode=full)
(/jspui/handle/123456789/4669/statistics)