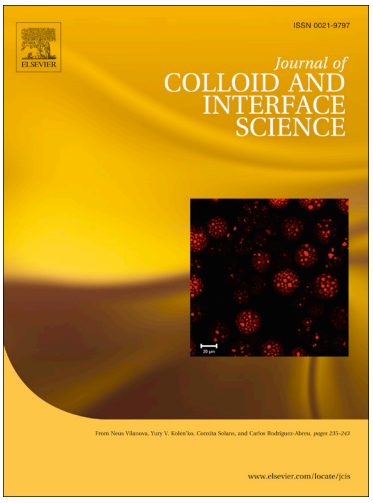

Proton-Consumed Nanoarchitectures toward Sustainable and Efficient Photophosphorylation

Guangle Li, Jinbo Fei, Youqian Xu, Jong-Dal Hong, Junbai Li

PII: S0021-9797(18)31156-1
DOI: https://doi.org/10.1016/j.jcis.2018.09.082
Reference: YJCIS 24133

To appear in: *Journal of Colloid and Interface Science*

Received Date: 29 August 2018
Revised Date: 24 September 2018
Accepted Date: 24 September 2018

Please cite this article as: G. Li, J. Fei, Y. Xu, J-D. Hong, J. Li, Proton-Consumed Nanoarchitectures toward Sustainable and Efficient Photophosphorylation, *Journal of Colloid and Interface Science* (2018), doi: https://doi.org/10.1016/j.jcis.2018.09.082

Proton-Consumed Nanoarchitectures toward Sustainable and Efficient Photophosphorylation

Guangle Li, [+ab] Jinbo Fei, [+a] Youqian Xu, [ab] Jong-Dal Hong[*c] and Junbai Li[*ab]

[a] Beijing National Laboratory for Molecular Sciences (BNLMS), CAS Key Lab of Colloid, Interface and Chemical Thermodynamics, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China

[b] University of Chinese Academy of Sciences, Beijing 100049, China

[c] Department of Chemistry, Incheon National University, Incheon 21022, South Korea

[+] These authors contributed equally to this work.

[*] Corresponding Author.

E-mail address: jbli@iccas.ac.cn, hong5506@inu.ac.kr

Abstract

At present, photophosphorylation in natural or artificial systems is accomplished by the production of protons or their pumping across the biomembranes. Herein, different from this strategy above, we demonstrate a designed system which can effectively enhance photophosphorylation by photo-induced proton-scavenging through molecular assembly. Upon the introduction of photobase generators, a (photo-) chemical reaction occurs to produce hydroxyl ions. Accompanying the further extramembranous acid-base neutralization reaction, an outbound flow of protons is generated to drive the reconstituted adenosine triphosphate (ATP) synthase to produce ATP. That is, contrary to biochemistry, the proton gradient to drive photophosphorylation derives from the scavenging of protons present in the external medium by hydroxyl ions, produced by the partially photo-induced splitting of photobase generator. Such assembled system holds great potential in ATP-consuming bioapplications.

Keywords: molecular assembly; nanoarchitectures; biomimetic synthesis; photophosphorylation; photobase