

## Accepted Manuscript

Energy dissipation mechanisms in the FCPb light-harvesting complex of the diatom *Cyclotella meneghiniana*

Huzifa M.A.M. Elnour, Lars Dietzel, Charusheela Ramanan, Claudia Büchel, Rienk van Grondelle, Tjaart P.J. Krüger



PII: S0005-2728(18)30224-X  
DOI: doi:[10.1016/j.bbabbio.2018.07.009](https://doi.org/10.1016/j.bbabbio.2018.07.009)  
Reference: BBABIO 47957  
To appear in: *BBA - Bioenergetics*  
Received date: 11 May 2018  
Revised date: 20 July 2018  
Accepted date: 24 July 2018

Please cite this article as: Huzifa M.A.M. Elnour, Lars Dietzel, Charusheela Ramanan, Claudia Büchel, Rienk van Grondelle, Tjaart P.J. Krüger , Energy dissipation mechanisms in the FCPb light-harvesting complex of the diatom *Cyclotella meneghiniana*. Bbabio (2018), doi:[10.1016/j.bbabbio.2018.07.009](https://doi.org/10.1016/j.bbabbio.2018.07.009)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Energy dissipation mechanisms in the FCPb light-harvesting complex of the diatom *Cyclotella meneghiniana*

Huzifa M.A.M. Elnour<sup>1</sup>, Lars Dietzel<sup>2</sup>, Charusheela Ramanan<sup>3</sup>,  
Claudia Büchel<sup>2</sup>, Rienk van Grondelle<sup>3</sup>, Tjaart PJ Krüger<sup>1\*</sup>

<sup>1</sup>Department of Physics, University of Pretoria, Pretoria, South Africa

<sup>2</sup>Institute of Molecular Biosciences, Goethe University Frankfurt, Frankfurt, Germany

<sup>3</sup>Department of Physics, VU University, Amsterdam, The Netherlands

\*To whom correspondence should be addressed; E-mail: tjaart.kruger@up.ac.za

July 20, 2018

## Abstract

Transient absorption spectroscopy has been applied to investigate the energy dissipation mechanisms in the nonameric fucoxanthin-chlorophyll-a,c-binding protein FCPb of the centric diatom *Cyclotella meneghiniana*. FCPb complexes in their unquenched state were compared with those in two types of quenching environments, namely aggregation-induced quenching by detergent removal, and clustering via incorporation into liposomes. Applying global and target analysis, in combination with a fluorescence lifetime study and annihilation calculations, we were able to resolve two quenching channels in FCPb that involve chlorophyll-a pigments for FCPb exposed to both quenching environments. The fast quenching channel operates on a timescale of tens of picoseconds and exhibits similar spectral signatures as the unquenched state. The slower quenching channel operates on a timescale of tens to hundreds of picoseconds, depending on the degree of quenching, and is characterized by enhanced population of low-energy states between 680 and 710 nm. The results indicate that FCPb is, in principle, able to function as a dissipater of excess energy and can do this *in vitro* even more efficiently than the homologous FCPa complex, the sole complex involved in fast photoprotection in these organisms. This indicates that when a complex displays photoprotection-related spectral signatures *in vitro* it does not imply that the complex participates in photoprotection *in vivo*. We suggest that FCPa is favored over FCPb as the sole energy-regulating complex in diatoms because its composition can more easily establish the balance between light-harvesting and quenching required for efficient photoprotection.

Download English Version:

<https://daneshyari.com/en/article/8949254>

Download Persian Version:

<https://daneshyari.com/article/8949254>

[Daneshyari.com](https://daneshyari.com)