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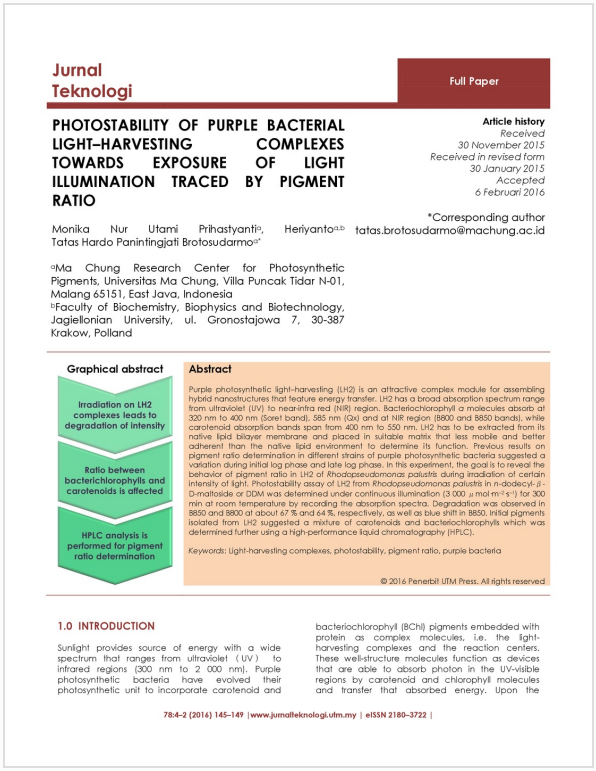

Jurnal Teknologi

Full Paper

PHOTOSTABILITY OF PURPLE BACTERIAL LIGHT–HARVESTING COMPLEXES TOWARDS EXPOSURE OF LIGHT ILLUMINATION TRACED BY PIGMENT RATIO

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Graphical abstract

Irradiation on LH2 complexes leads to degradation of intensity

Ratio between bacterichlorophylls and carotenoids is affected

HPLC analysis is performed for pigment ratio determination

Abstract

Purple photosynthetic light-harvesting (LH2) is an attractive complex module for assembling hybrid nanostructures that feature energy transfer. LH2 has a broad absorption spectrum range from ultraviolet (UV) to near-infra red (NIR) region. Bacteriochlorophyll a molecules absorb at 320 nm to 400 nm (Soret band), 585 nm (Qx) and at NIR region (B800 and B850 bands), while carotenoid absorption bands span from 400 nm to 550 nm. LH2 has to be extracted from its native lipid bilayer membrane and placed in suitable matrix that less mobile and better adherent than the native lipid environment to determine its function. Previous results on pigment ratio determination in different strains of purple photosynthetic bacteria suggested a variation during initial log phase and late log phase. In this experiment, the goal is to reveal the behavior of pigment ratio in LH2 of *Rhodopseudomonas palustris* during irradiation of certain intensity of light. Photostability assay of LH2 from *Rhodopseudomonas palustris* in *n*-dodecyl-*β*-D-maltoside or DDM was determined under continuous illumination (3 000 μ mol m^{-2}s^{-1}) for 300 min at room temperature by recording the absorption spectra. Degradation was observed in B850 and B800 at about 67 % and 64 %, respectively, as well as blue shift in B850. Initial pigments isolated from LH2 suggested a mixture of carotenoids and bacteriochlorophylls which was determined further using a high-performance liquid chromatography (HPLC).

Keywords: Light-harvesting complexes, photostability, pigment ratio, purple bacteria

1.0 INTRODUCTION

Sunlight provides source of energy with a wide spectrum that ranges from ultraviolet (UV) to infrared regions (300 nm to 2 000 nm). Purple photosynthetic bacteria have evolved their photosynthetic unit to incorporate carotenoid and bacteriochlorophyll (BChl) pigments embedded with protein as complex molecules, i.e. the light-harvesting complexes and the reaction centers. These well-structure molecules function as devices that are able to absorb photon in the UV-visible regions by carotenoid and chlorophyll molecules and transfer that absorbed energy. Upon the

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