

force field doesn't contain force constants needed to describe the modified parts of the phosphonate analogs [9]. The completion was made on the base of ab initio calculations [3].

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## FUNCTIONAL RECONSTITUTION OF PHOTOSYSTEM 2 INTO LIPOSOMES

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Most recent structural data on photosystem 2 (PS2), the first membrane protein complex in the photosynthetic electron transport chain, confirm that this complex exists as a functional dimer in the thylakoid membrane of cyanobacteria [1, 2]. Besides the membrane embedded part of this dimer with dimensions of 190 Å x 100 Å x 40 Å, this complex also extends about 10 Å out of the membrane in the stromal region and 55 Å in the lumen; the latter is referred to as the oxygen evolving complex, harbouring the water-splitting site. Developing an appropriate method to reconstitute dimeric PS2 into liposomes should finally help

to answer the fundamental question concerning its structure-based function: Is a dimeric structure a prerequisite for optimal watersplitting activity (monomeric complexes, solubilized by detergent, are active, too, although at a lower level) and which is the impact of the lipid-phase-composition on the water-splitting activity? Here we present data on the orientation of reconstituted dimeric PS2 from the cyanobacterium *Thermosynechococcus elongatus* and also give indications for its activity within the liposomes and monomer-dimer distribution (by EM analysis).

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## ELECTRON MICROSCOPY AND SINGLE PARTICLE ANALYSIS OF PHOTOSYSTEM II FROM RED ALGA PORPHYRIDIUM CRUENTUM

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Photosystem II (PSII) is a multisubunit pigment-protein complex embedded in the thylakoid membranes of higher plants, algae and cyanobacteria [1-3]. It performs series of photochemical reactions resulting in the reduction of plastoquinone, the oxidation of water, and the formation of a transmembrane pH gradient. The essential components of the PSII complex are intrinsic membrane proteins that are almost identical between cyanobacteria and higher plants: they include the D1 and D2 reaction center proteins, chlorophyll *a*-binding proteins CP47 and CP43, and subunits of cytochrome *b*-559 (cyt *b*-559) and several low-molecular weight proteins with unknown functions [3, 4].

In addition, there are extrinsic proteins associated with PSII, which play important roles in maintaining the function and stability of the oxygen-evolving complex [5]. As both cyanobacteria and higher plants contain 33-kDa extrinsic subunit they differ in composition of the other luminal subunits. While higher plants and green algae contain the 23 and 16 kDa extrinsic subunits, in cyanobacteria,