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Time-resolved generation of membrane potential by  $ba_3$  cytochrome c oxidase from *Thermus thermophilus* coupled to single electron injection into the O and  $O_H$  states

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## ACCEPTED MANUSCRIPT

Time-resolved generation of membrane potential by  $ba_3$  cytochrome c oxidase from *Thermus thermophilus* coupled to single electron injection into the O and O<sub>H</sub> states

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Keywords: Cytochrome c oxidase; Charge transfer steps; Catalytic cycle intermediates; Membrane potential; *Thermus thermophilus*.

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**Abbreviations**: BNC, binuclear heme  $a_3$ /Cu<sub>B</sub> center; PLS, proton loading site; Rubpy, tris(2,2'-bipyridyl) ruthenium; Tris, tris(hydroxymethyl)aminomethane;  $\tau$ , time constant;  $\Delta\Psi$ , transmembrane electric potential difference; DM, (dodecyl L-D-maltoside).

**Running Title**: The O $\rightarrow$ E and O<sub>H</sub> $\rightarrow$ E<sub>H</sub> transitions of  $ba_3$  from T.thermophilus

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