

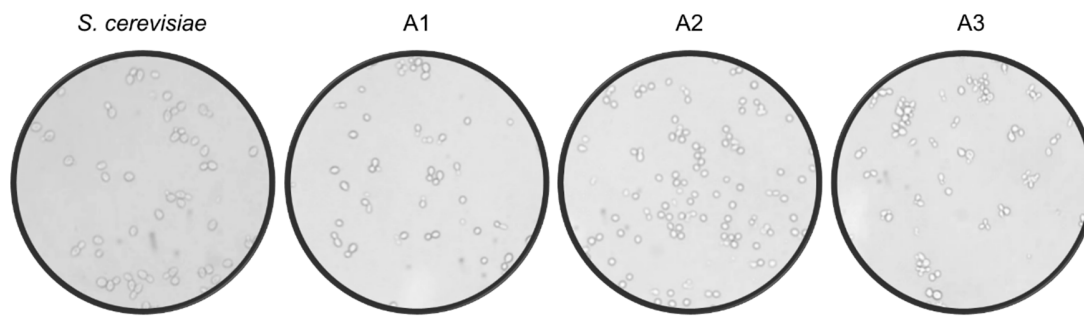
## **Electronic supplementary information (ESI)**

### **Biosynthesis of Cu-In-S Nanoparticles by a Yeast Isolated from Union Glacier, Antarctica: A platform for Enhanced Quantum Dot-Sensitized Solar Cells**

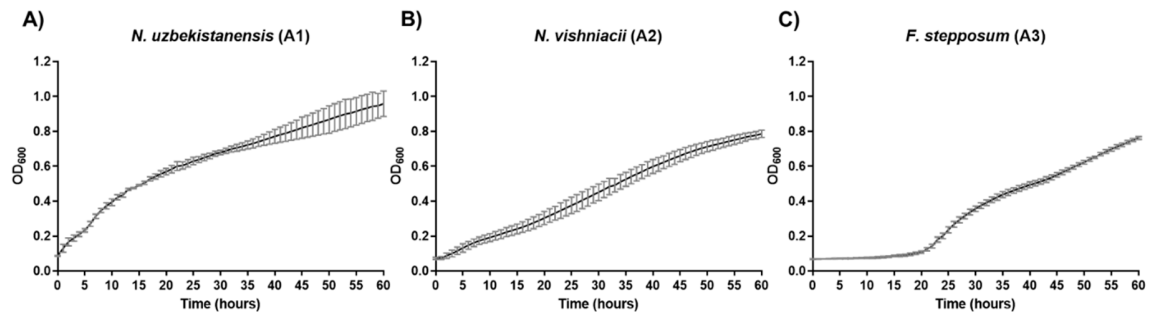
Carolina Arriaza-Echanes<sup>1</sup>, Jessica L. Campo-Giraldo<sup>1</sup>, Felipe Valenzuela-Ibaceta<sup>1</sup>,  
Javiera Ramos-Zúñiga<sup>1</sup>, José M. Pérez-Donoso<sup>1\*</sup>

<sup>1</sup>Universidad Andrés Bello, BioNanotechnology and Microbiology Laboratory, Center for Bioinformatics and Integrative Biology (CBIB), Facultad de Ciencias de la Vida, Av. República # 330, Santiago, Chile.

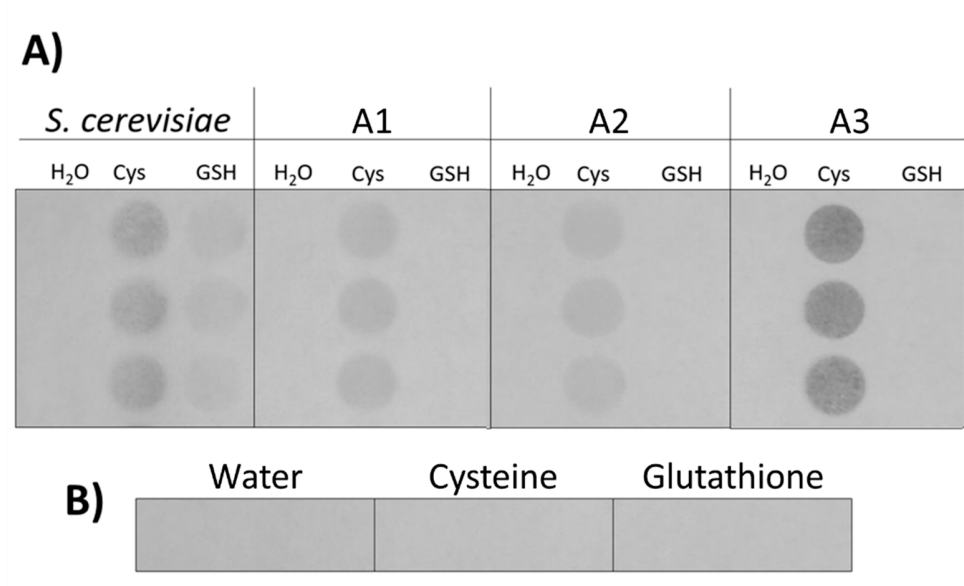
\*Corresponding author. Email: jose.perez@unab.cl



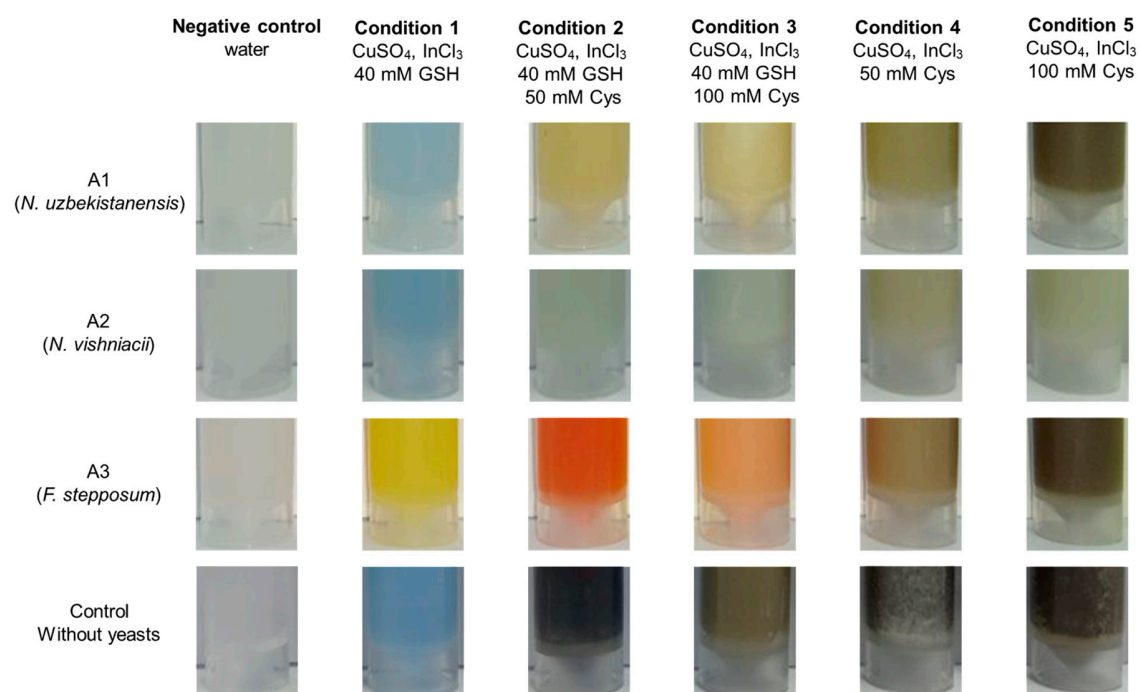
**Figure S1: Morphological analysis of isolated yeasts.** Representative microscopy images of isolates A1, A2, A3 and *S. cerevisiae*, taken using brightfield microscopy at 40 X magnification.



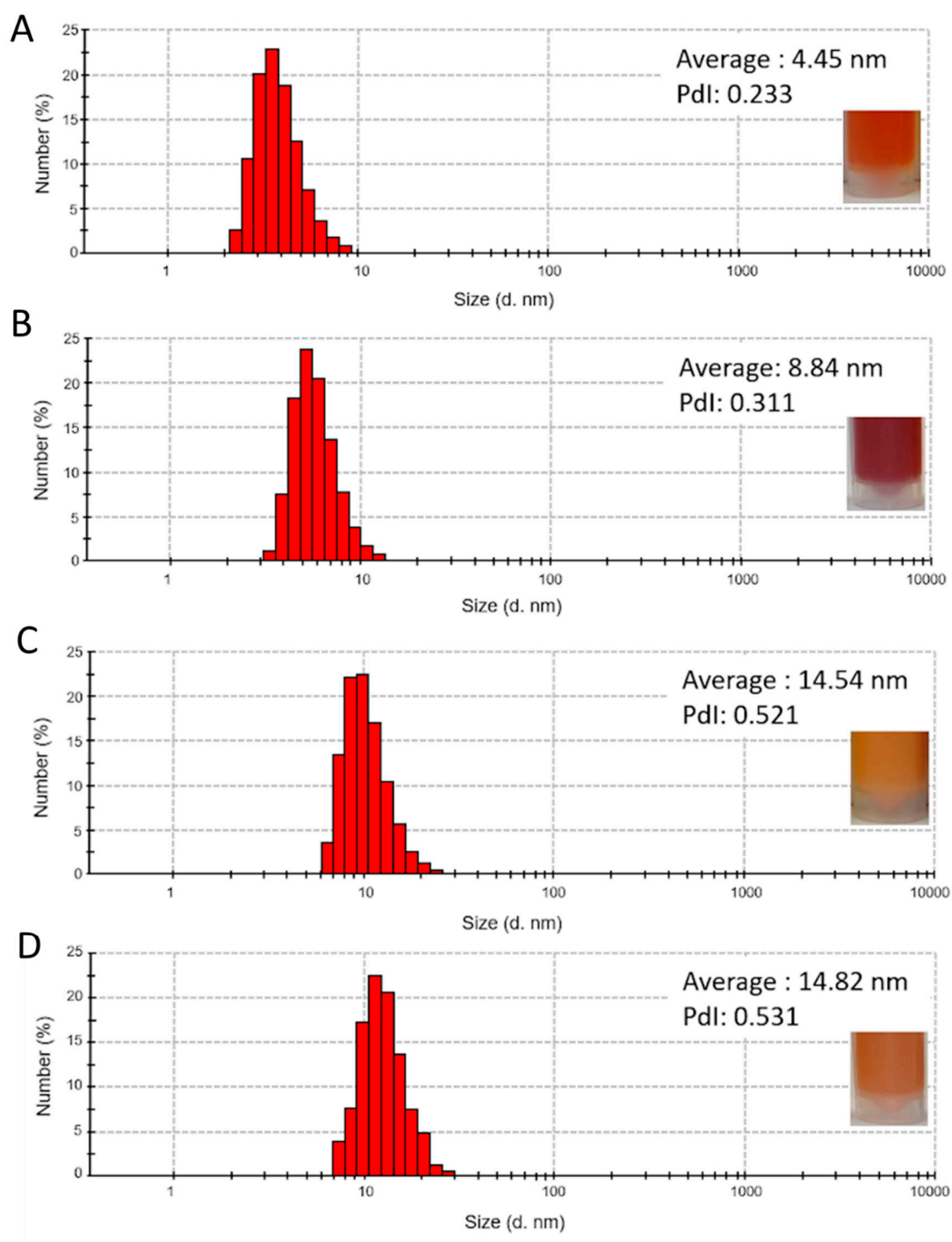
**Figure S2: Growth curves of isolated yeasts from Union Glacier.** (A) Growth curve of A1 isolate, *N. uzbekistanensis*. (B) Growth curve of A2 isolate, *N. vishniacii*. (C) Growth curve of A3 isolate, *F. stepposum*. All isolates were grown at 20 °C during 60 hours, with orbital agitation, and the OD600 value of cultures was measured each hour.



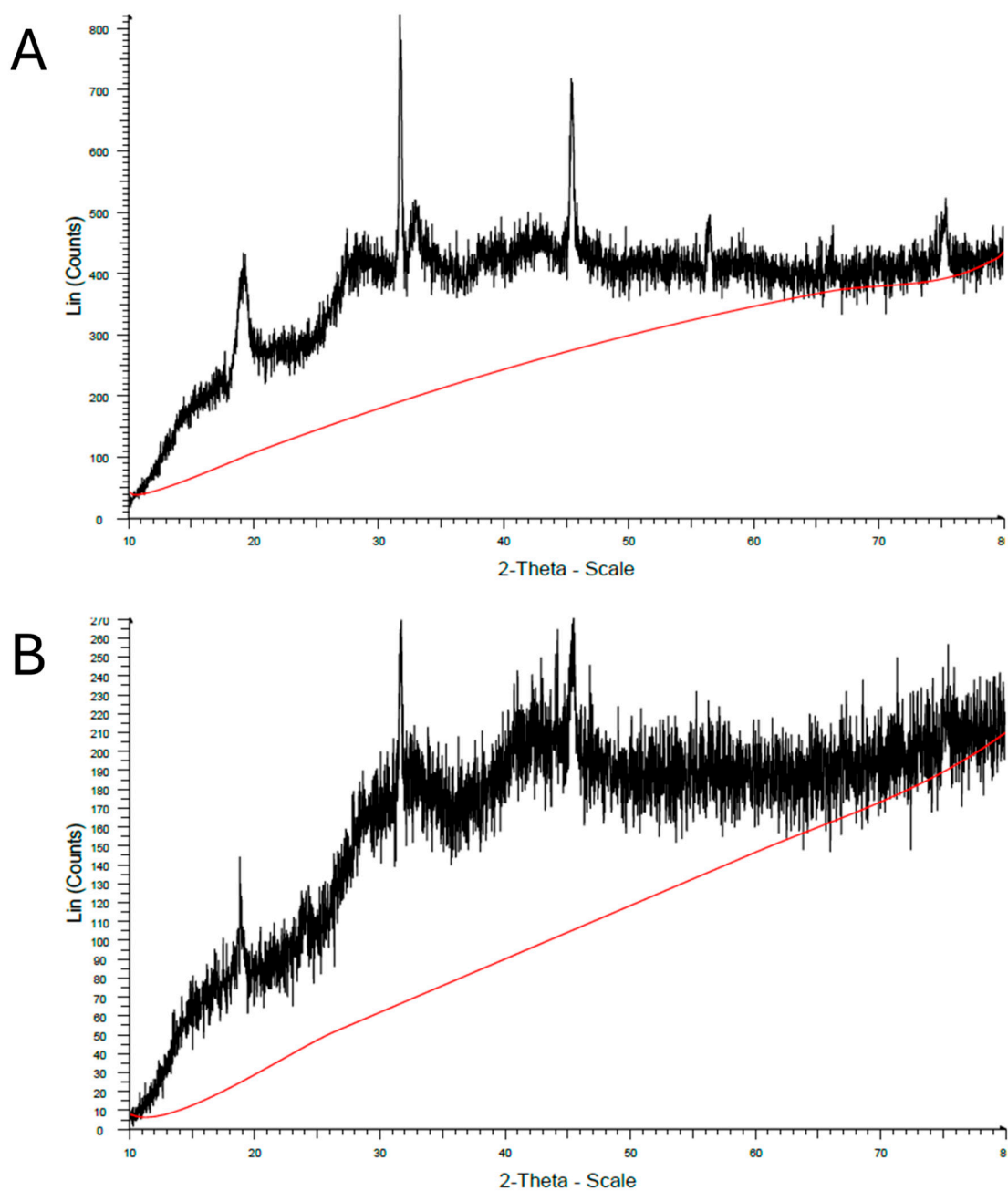
**Figure S3: Hydrogen sulfide production assay.** A) Filter papers showing the production of black precipitate as a consequence of sulfide interaction with lead acetate. All assays were performed with yeasts resuspended in distilled water at an OD<sub>600</sub> of 0.6. H<sub>2</sub>O: yeast in water. Cys: yeast with the addition of 100 mM cysteine. GSH: yeast with the addition of 40 mM glutathione. B) Controls without yeast.



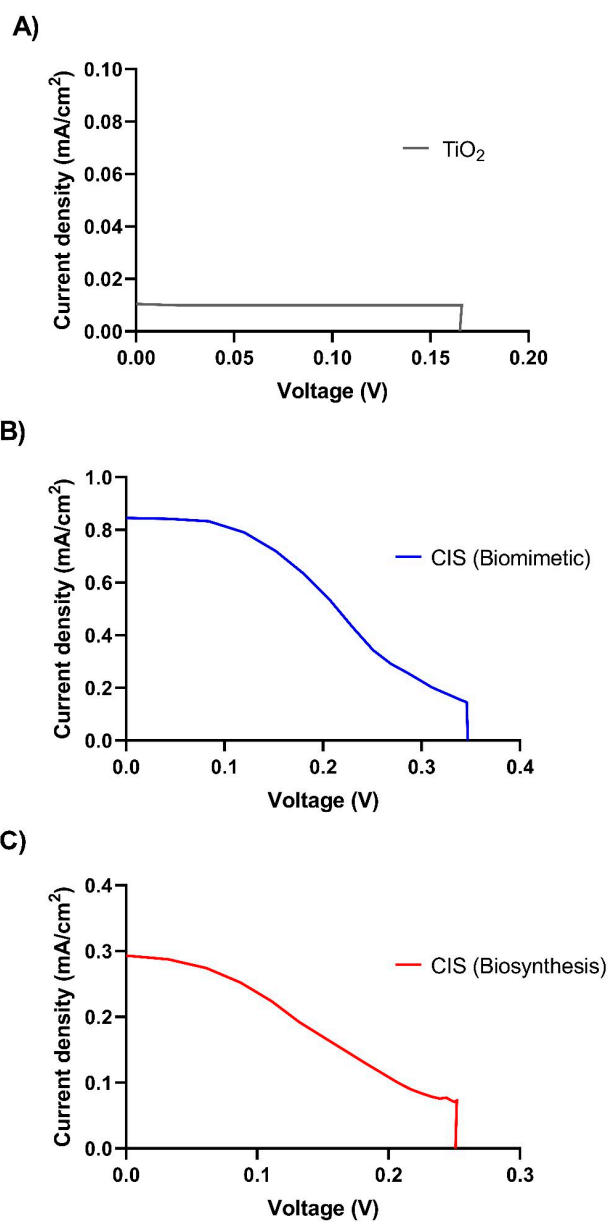
**Figure S4: Evaluation of Cu-In-S biosynthesis conditions.** Assays for all yeast isolates and yeast-free control conditions were performed at 20 °C and 14 days of incubation.



**Figure S5: Size evaluation of biosynthesized nanoparticles.** The size was determined using dynamic light scattering (DLS), A and B correspond to the synthesis performed with 50 mM cysteine at 14 and 30 days respectively. C and D correspond to the synthesis with 100 mM cysteine at 14 and 30 days respectively.

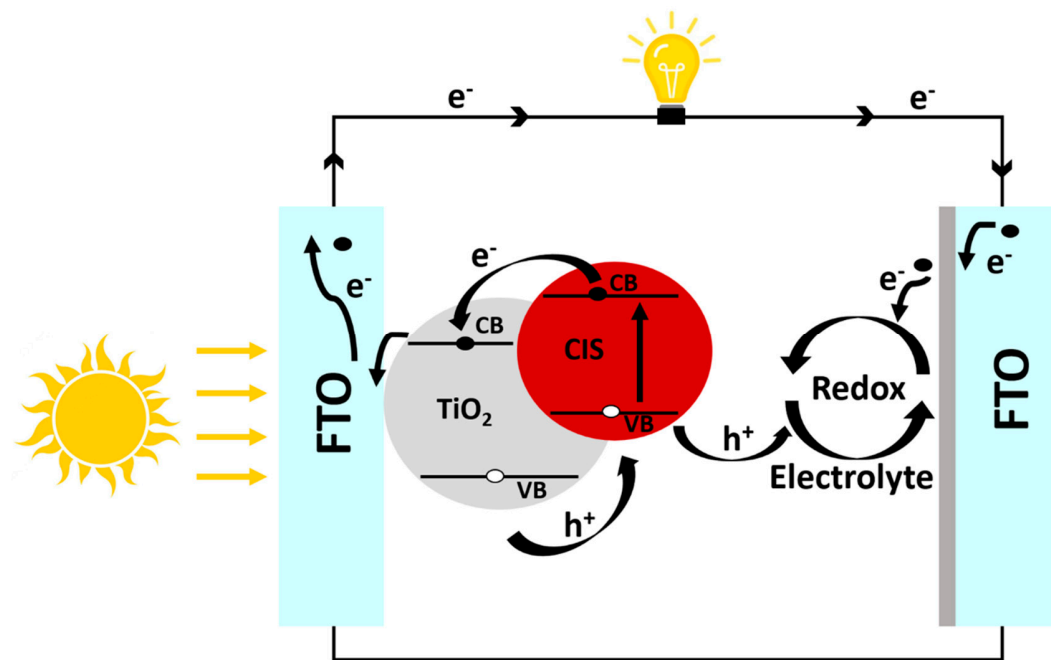


**Figure S6: XRD analysis of CIS nanoparticles.** (A & B) Diffraction patterns of CIS nanoparticles synthesized at 14 and 30 days of incubation, respectively. The red line represents the area of the amorphous component.



**Figure S7: Current-voltage (I-V) curves of solar cells.** A) TiO<sub>2</sub>, B) CIS (biomimetic) and C) CIS (biosynthesis).





**Figure S8: Schematization of the operation mechanism of quantum dot sensitized solar cells (QDSSC).**