

## **Supporting Information**

### **The mechanistic insight into the biomilling of goethite ( $\alpha$ -FeO(OH)) nanorods using yeast *Saccharomyces cerevisiae***

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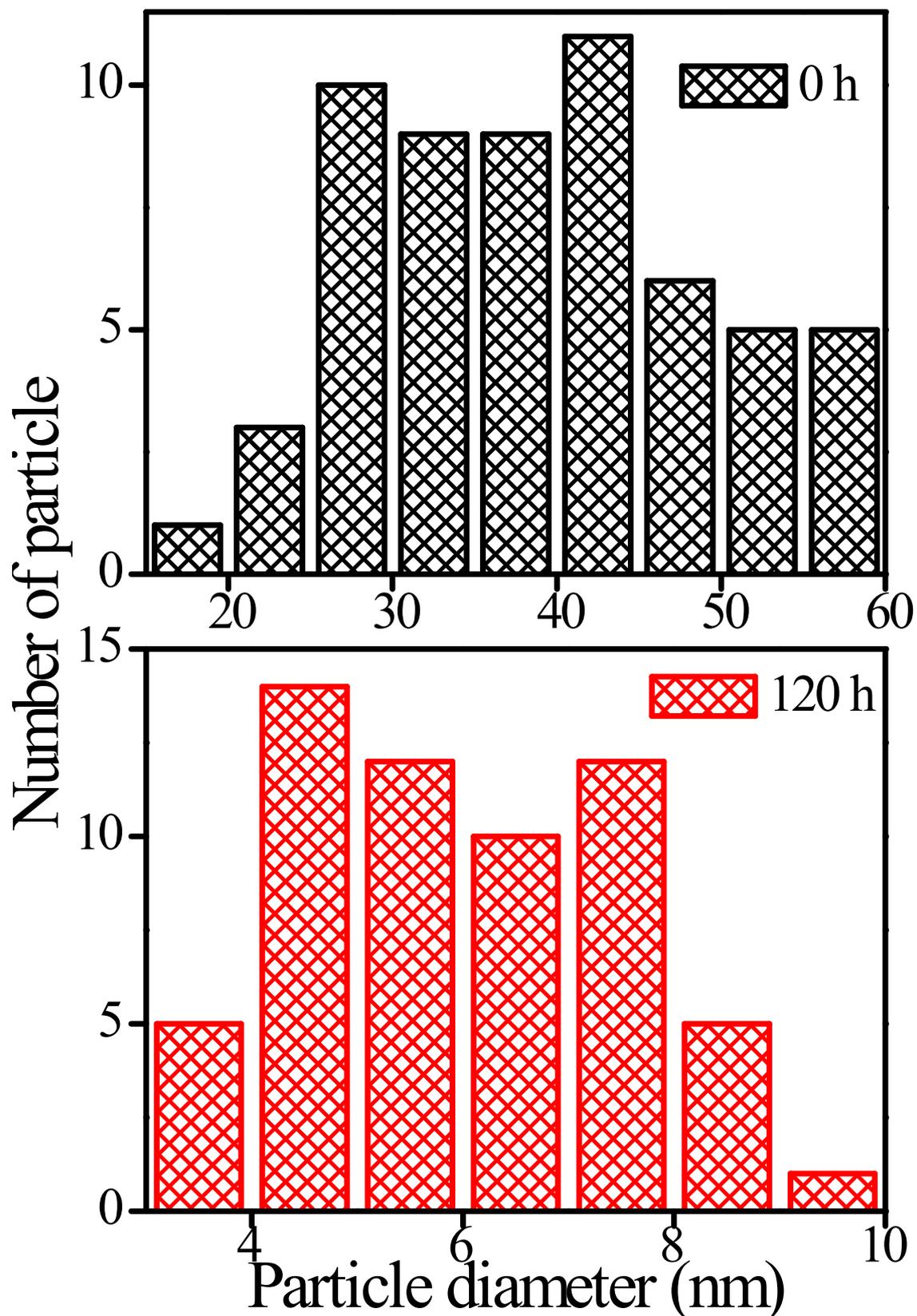
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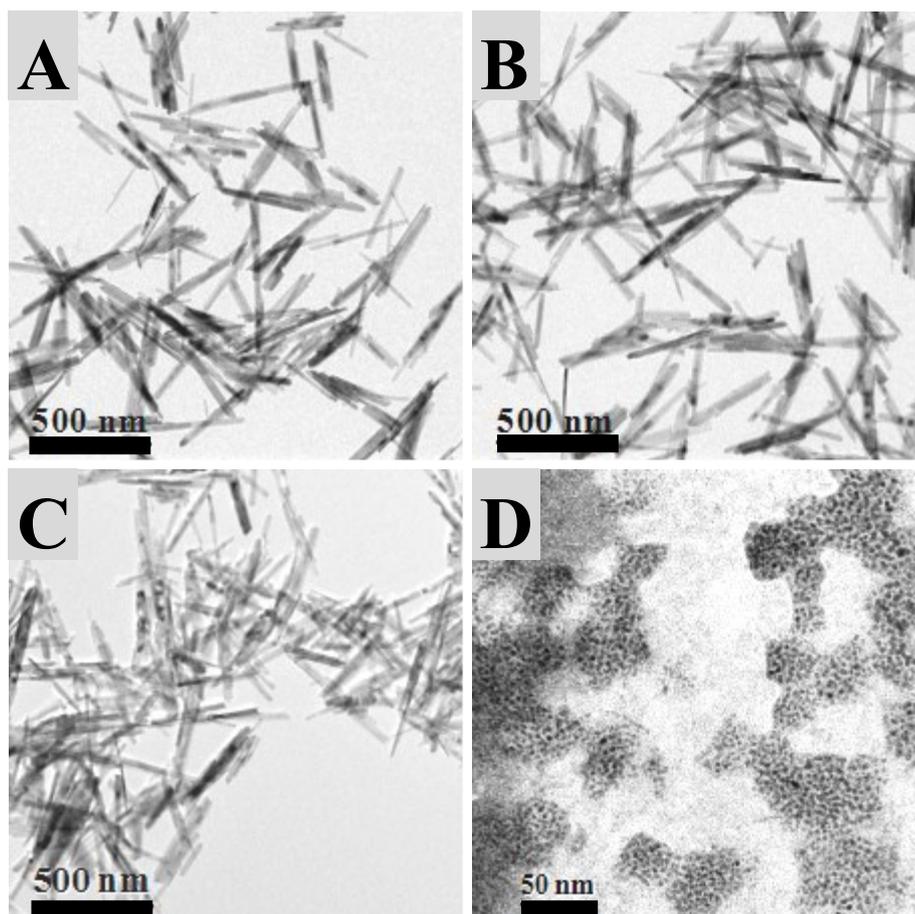
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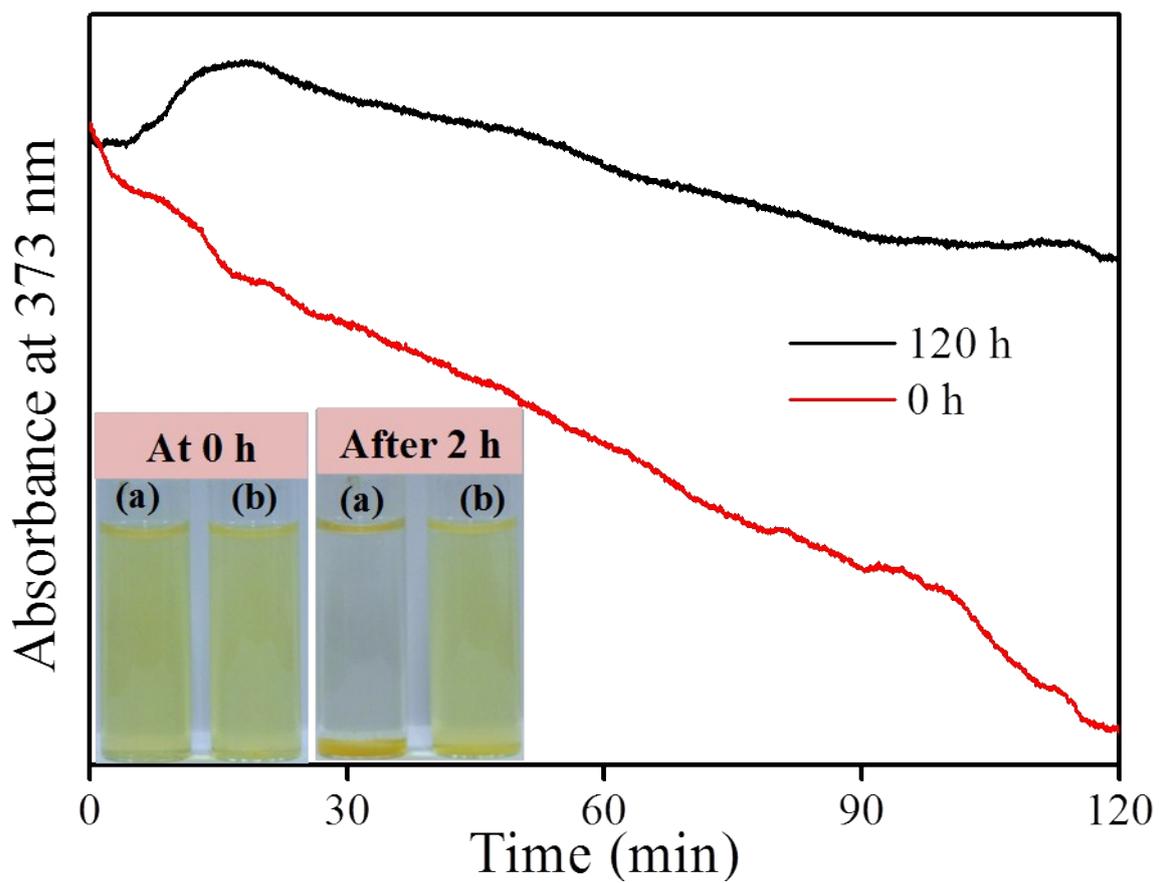
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**Figure S1.** The particle size (diameter) distribution of the  $\alpha$ -FeO(OH) nanoparticles, before (0 h) and after (120 h) biomilling.



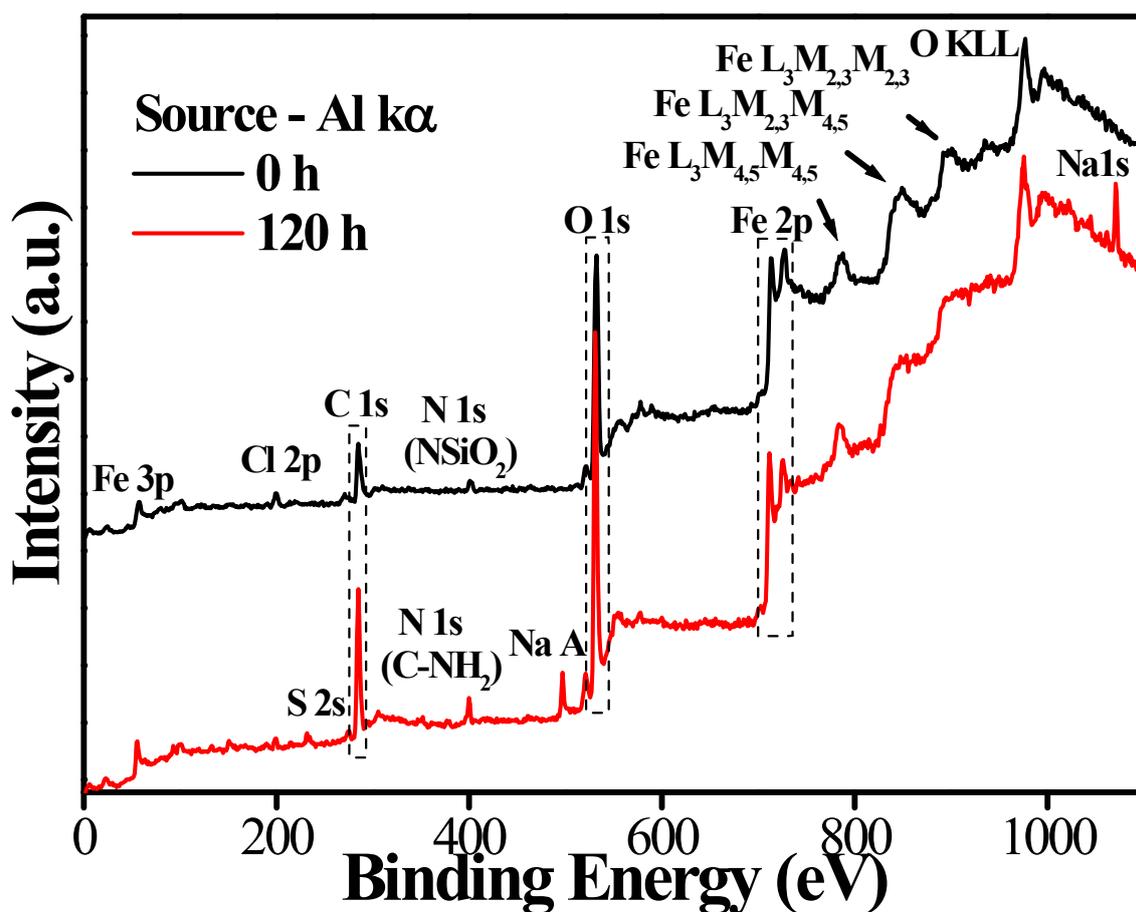
**Figure S2.** The TEM images of the  $\alpha$ -FeO(OH) nanoparticles before (A) and after exposure with PBS (B, in absence of yeast cells), dead yeast cells (C), and live yeast cells (D) for a period of 120 h indicates that the degradation of rods occurs only in the case of live yeast cells.



**Figure S3.** The dispersibility of the  $\alpha$ -FeO(OH) nanoparticles in aqueous suspension as a function of time. Inset shows the photographs of (a) 0 h sample, and (b) 120 h biomilled sample clearly indicates the instability of 0 h sample in aqueous suspension in comparison to 120 h sample.

## XPS Survey Spectrum

The XPS survey scan has performed to get the information about the relative distribution of different elements before and after biomilling. For this purpose, the energy pass of 50 eV used for XPS survey scan at an energy resolution of 1 eV. The adventitious carbon (C 1s) peak was used for the charge correction reference and both the spectra were normalized against Fe 2p peak. The relative elemental contents were estimated by measuring the relative intensities of peaks. The 2.6 times increase in carbon and 1.7 times increase in oxygen content depicts the presence of organic molecules (proteins).<sup>1</sup> The presence of sulfur (S 2s) and nitrogen (N 1s) depicts the presence of amino acids of protein.<sup>2</sup> Thus, these results support the presence of protein capping around nanoparticles.



**Figure S4.** The XPS survey spectra of 0 h and 120 h biomilled samples showing the relative distribution of various elements in the samples.

## References:

- (1) Johansson, E.; Nyborg, L. XPS Study of Carboxylic Acid Layers on Oxidized Metals with Reference to Particulate Materials. *Surf. Interface Anal.* **2003**, *35*, 375–381.
- (2) Vanea, E.; Simon, V. XPS Study of Protein Adsorption onto Nanocrystalline Aluminosilicate Microparticles. *Appl. Surf. Sci.* **2011**, *257*, 2346–2352.