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Identification of the Mechanical Properties of Schizosaccharomyces Pombe and Its Spores

"quantification Of Life and Death at Dormant State"

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The mechanical properties of *Schizosaccharomyces pombe* play a crucial role in its structural resilience and physiological adaptability. This study presents a comparative analysis of the mechanical properties of living yeast cells and dormant spores. Using Atomic Force Microscopy (AFM), we quantified the stiffness of the yeast cell wall, while a nano-indenter was employed to assess the significantly higher rigidity of spores. Additionally, Optical Tweezer (OT) measurements enabled the investigation of non-equilibrium intracellular dynamics, differentiating active metabolic states from dormant phases. Our results demonstrate a substantial increase in cell wall stiffness during dormancy, highlighting critical structural adaptations that enhance the survival of *S. pombe* under unfavorable conditions. Furthermore, microrheology experiments indicate that the cytoplasmic environment of vegetative cells exhibits active mechanical properties, whereas spores display predominantly passive behavior. These findings provide new insights into the mechanical regulation of yeast life cycles and may contribute to the optimization of biotechnological applications involving *S. pombe*.