

AFM and Proteomic Analysis of Spore Coat Related to Spore Germination of *Geobacillus stearothermophilus*

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Abstract—*Geobacillus stearothermophilus* is a spore-forming thermophilic bacterium, and extensively used as biological indicators in sterilization due to their spores' resistance to heat. Atomic force microscope (AFM) showed that the size of an intact spore was $1.7 \pm 0.3 \mu\text{m}$ long, $0.8 \pm 0.2 \mu\text{m}$ wide. Spores could be triggered to germinate by L-form hydrophobic amino acids especially L-valine. Coat-removal spores became more flatten without bumps that usually present on spore coat, and their germination was to a large degree inhibited. In addition, after treatment with alkaline glutaraldehyde spores seemed sealed in a cocoon-like shell and hence could germinate any more. Proteomic analysis showed that cortex fragment lytic enzymes (CFLE) excluding coat proteins were abundant in spore coat, such as SleB and CwlJ which are found to play crucial role in spore germination of bacillus and clostridium. This study provides an insight into relatedness between spore coat and germination of *G. stearothermophilus* from AFM and proteomic analysis.

Keywords—*Geobacillus stearothermophilus*, AFM, spore coat, spore germination, CFLE.

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