Abstract

Polyhydroxyalkanoates (PHA) are a class of polyesters that can be produced by a variety of microorganisms. The first PHA to be discovered and the most studied is polyhydroxybutyrate (PHB). A remarkable characteristic of PHB is its biodegradability in various environments. Even though PHAs are hydrophobic and water-insoluble, they can be degraded by PHA depolymerases secreted by many microorganisms. There are potential applications for PHAs within chemical, medical and pharmaceutical industries, primarily due to their biodegradability. The surface properties should be modified in most of the applications. This study demonstrated that polyhydroxybutyrate (PHB) depolymerase can be employed as molecular tool to covalently immobilize acid phosphatase to PHB granule surface. *T. thermophilus* extracellular PHB depolymerase was purified and cross-linked to acid phosphatase in the presence of glutaraldehyde. The cross-linked enzymes were then selectively and functionally immobilized to PHB granule surface. The surface-modified PHB granules were tested for acid phosphatase activity. The immobilized enzyme was active at medium temperature with no additional loss of activity during preservation. The immobilized acid phosphatase was reused for the determination of the enzyme stability during continuous assays. The reusability of immobilized acid phosphatase was also studied with promising results, since the enzyme was active through all operational cycles used.