

## Unraveling Structure and Function of PETase toward Superior Poly(ethylene terephthalate) Degradation

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Poly(ethylene terephthalate) (PET) are very popular plastics, but serious contaminants with its non-biodegradability. Therefore, bio-based PET waste degradation becomes significant. With the recently found PET-degrading bacterium, *Ideonella sakaiensis*, its possible use in microbial PET degradation becomes considerable. Here we firstly report the crystal structure of *I. sakaiensis* PETase (*IsPETase*) with high resolution. It helps to confirm the catalytic features of *IsPETase* and predict its molecular mechanism on degrading PET to understand the essential factors to degrade PET efficiently. Moreover, we succeed in developing the variant of *IsPETase* with 32.4% enhanced PET-degradability over its wild type using structural-based protein engineering. This work was supported by the Technology Development Program to Solve Climate Changes on Systems Metabolic Engineering for Biorefineries from the Ministry of Science and ICT (MSIT) through the National Research Foundation (NRF) of Korea (NRF-2012M1A2A2026556 and NRF-2012M1A2A2026557).