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One-step assembly of organophosphorus hydrolase and affinity of peptide on phage and its application on biosensor

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Organophosphorus compounds (OPs), a group of neurotoxins, are widely used as pesticides and insecticides. They not only pollute the environment but also deteriorate human health. Owing to their destructive effects, these compounds should be strictly regulated and monitored. Therefore, emphasis should be put on developing methods for immediate detection and effective elimination. In our previous study, a novel biosensor utilizing Organophosphorus Hydrolase (OPH) for OPs degradation and detection was proposed. M13 filamentous bacteriophage served as a vector carrying OPH on the surface of its pVIII coat protein via leucine zippers. Moreover, a mild steel-binding peptide was attached on its pIII coat protein for immobilization on mild steel electrode surface. The activity of OPH/M13 phage/mild steel biosensor was determined via electrochemical analysis and spectrophotometer. To our knowledge, the most important improvement is that the produced phage can be easily recovered by centrifugation rather than labor waste procedure. These results demonstrated the capability of proposed sensor may be useful in further development since both the specificity and activity of genetically engineered M13 phage are better compared to the wild-one.

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