Formaldehyde, as common contamination in daily life, is one of the most dangerous cancerogens in the world. The condition of formaldehyde pollution has alerted people. Thus, it is essential for everyone to detect and degrade formaldehyde right now. However, there is no simple and convenient way to detect and degrade formaldehyde. On the contrary, available methods are usually too complicated for the public with a great amount of drawbacks. For example, Spectrophotometry is limited by experiment conditions and Prices of chromatography equipment are usually high. So we want to design biobricks to solve this problem by using microorganisms.

**How to detect formaldehyde?**

With corporation of Wuhan University, We got a special promoter named hxlR in Bacillus subtilis, whose function is that it can be induced by formaldehyde and express downstream genes. Due to this feature, with the help of GFP, we designed a vector PSB1C3 by using a series of genes, hxlR and GFP. If this system works well, we will see fluorescence under UV-light.

**How to degrade formaldehyde?**

We found two key enzymes to degrade formaldehyde, named formate dehydrogenase (FDH) and formaldehyde dehydrogenase (PADH). Last year, Wuhan University added these two genes downstream Promoter hxlR directly, but did not get perfect results. Therefore, we improved this system. First, we adjusted prior vector by adding a gene called T7 RNA polymerase. What’s more, we used pET vectors to express two key enzymes, and constructed such a vector. Finally, when T7 polymerase is expressed, Vector pET-DUET can express PADH and FDH. In this way, the whole system can be induced by formaldehyde and express PADH and FDH to degrade it.

**Reference**

1. ZHANG Wenai. Research progress in analysis methods for formaldehyde. Hongqiao District of Tianjin Centers for Disease Control and Prevention, Tianjin 300132, China.
2. WANG Fang-ling, YANG Jian-zhong. Research progress in analysis methods for formaldehyde. Textile and Material College, Xi’an Polytechnic University, Xi’an 7 10048, China.

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Attribution

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