

## Design and preparation of intelligent response coating with antimicrobial peptide and its anti-microbial corrosion performance

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**Abstract** *H. illucens* larvae were immunologically induced by *D. vulgaris*. The functional classification of GO (Gene ontology) and the enrichment of KEGG (Kyoto encyclopedia of genes and genomes) signal pathways were analyzed respectively, respectively. An antimicrobial peptide prediction tool based on machine learning algorithm was used to predict the antimicrobial activity of peptides with different expression. Four novel antimicrobial peptides with the highest antibacterial fraction (DH-1, DH-2, DH-3, DH-4) were synthesized in solid phase and the highest antibacterial activity (AIGVKTLGAGLGYSSGWSHGLI) was selected through antibacterial performance test. The combination of DH-1 and THPS can reduce the dosage of fungicide by more than 60%, and the strengthening effect of fungicide is more significant, which may be attributed to the fact that DH-1 contains a large number of hydrophobic amino acids, which increases the permeability of bacterial cell membrane and makes it easier for fungicide to enter the cell interior. Using a new natural antimicrobial peptide DH-1 as a green antifouling agent and Mesoporous silica nanoparticle (MSN) as a nanostorage container, Using Tannic acid (TA) and Fe(III) complex (TA-Fe(III) complex (TAC) as nanovalves, a sulfur ion intelligent response antibacterial peptide-based antiseptic antifouling coating was successfully prepared (FIG. 1). The results showed that MSN-DH-1@TAC coating had no effect on the growth and metabolism of planktonic bacteria, but could inhibit the adhesion of d significant antibacterial activity when combined with 80 ppm THPS, saving more than 60% of the amount of fungicide compared to the high concentration fungicide alone. After soaking in the actual Marine environment for 3 months, the antifouling performance of MSN-DH-1@TAC coating is significantly improved compared with the blank coating, as shown in FIG. 2.

