

Supplementary Information

Corrosion self-warning and repair tracking polymeric coatings based on stimulus responsive nanosensors

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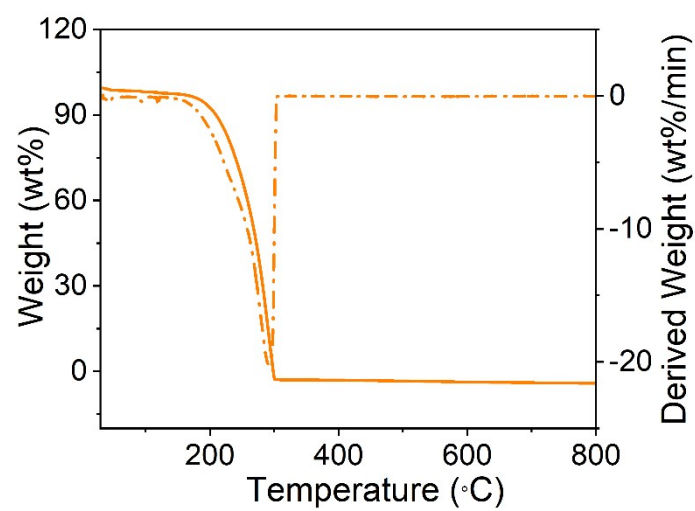


Fig. S1 TGA curve of Phen.

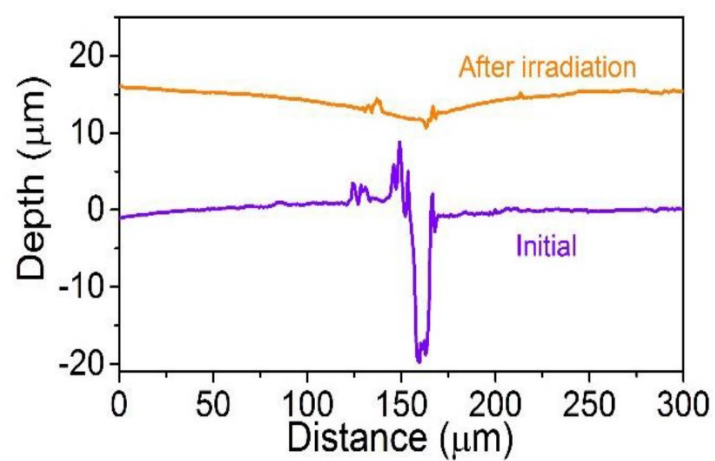


Fig. S2 Profiles around coating defect of GO-ZIF-Phen/PU coating before and after NIR irradiation.

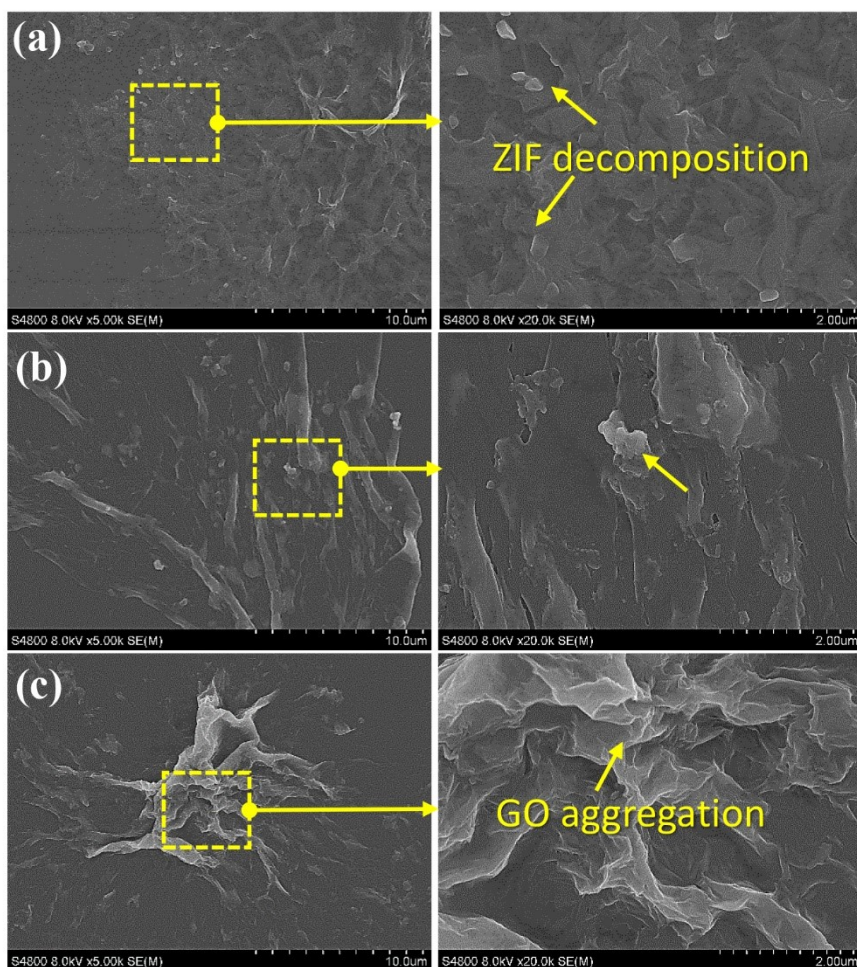


Fig. S3 SEM images of GO-ZIF nanomaterial in water with various pH conditions, (a) pH=5, (b) pH=3 and (c) pH=1.

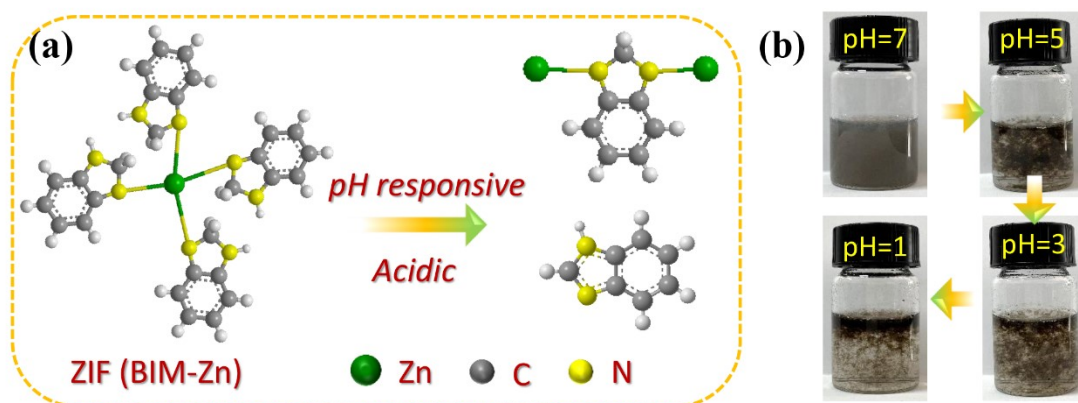


Fig. S4 (a) Possible decomposition process of ZIF nanoparticle and (b) optical images of ZIF suspension with addition different HCl.

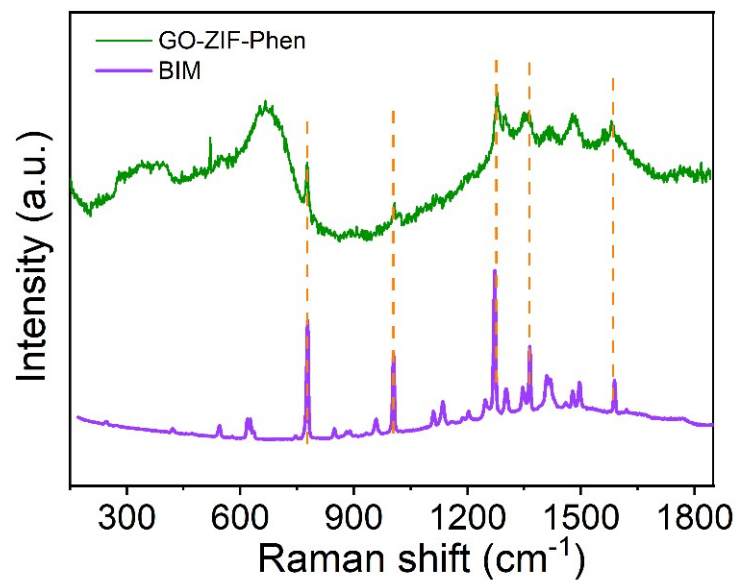


Fig. S5 Raman spectra of pure BIM and steel coated with GO-ZIF-Phen/PU coating after LEIS tests.

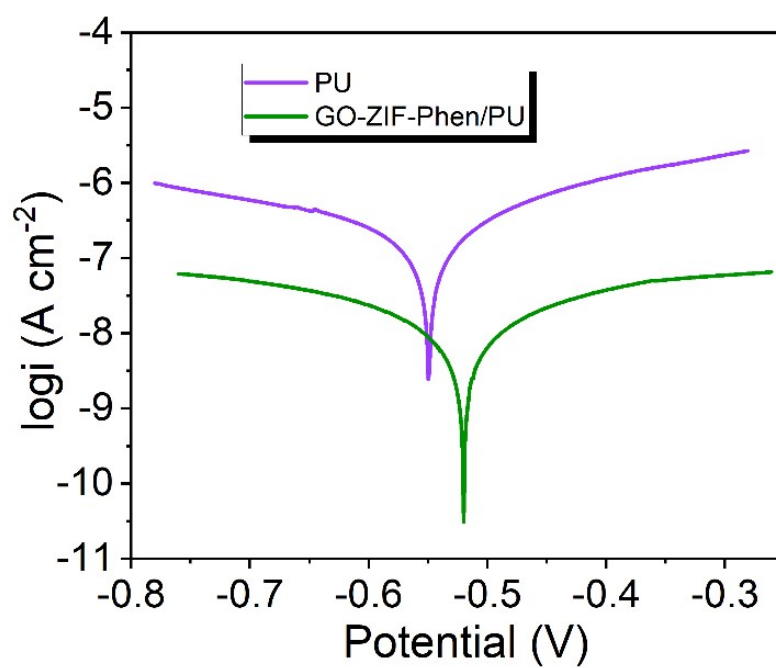


Fig. S6 Potentiodynamic polarization curves of the coated steels after damage repair in 3.5 wt% NaCl solution.

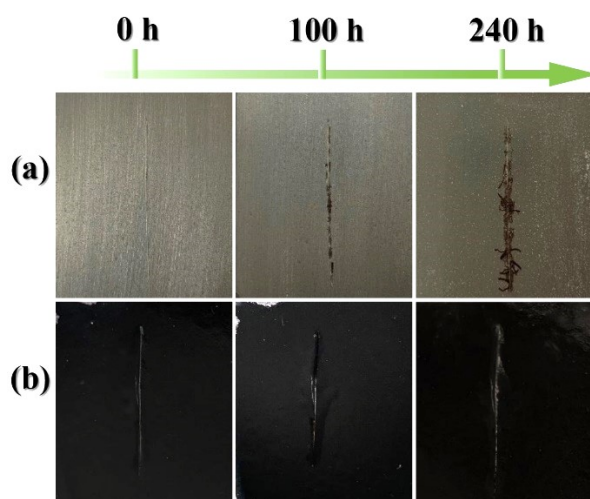


Fig. S7 Visual performance of the (a) pure PU and (b) GO-ZIF-Phen/PU coatings after 240 h of salt spray test.

Table S1. Fitting parameters of the EIS results for different coating samples.

Samples	Status	R_c ($\Omega \text{ cm}^2$)	Q_c ($F \text{ cm}^{-2} \text{ S}^{n-1}$)	R_{ct} ($\Omega \text{ cm}^2$)	Q_{dl} ($F \text{ cm}^{-2} \text{ S}^{n-1}$)	χ^2
PU	initial	8.23×10^6	9.31×10^{-11}			2.68×10^{-3}
	scratched	1.72×10^3	2.16×10^{-5}	3.54×10^4	3.62×10^{-6}	2.22×10^{-3}
	healed	1.03×10^3	3.45×10^{-10}	4.06×10^4	6.62×10^{-5}	4.41×10^{-3}
GO-ZIF-Phen/PU	initial	1.74×10^7	1.16×10^{-11}			5.10×10^{-3}
	scratched	3.14×10^4	8.36×10^{-6}	5.05×10^5	2.19×10^{-7}	9.62×10^{-3}
	healed	1.01×10^7	1.19×10^{-11}			3.81×10^{-3}

Table S2 Potentiodynamic polarization parameters of coated steel in 3.5 wt% NaCl solution.

Samples	E_{corr} (V)	I_{corr} ($A \text{ cm}^{-2}$)	R_p ($k\Omega \text{ cm}^2$)	β_a ($mV \text{ dec}^{-1}$)	β_b ($mV \text{ dec}^{-1}$)
PU	-0.55	2.58×10^{-7}	176	170	-272
GO-ZIF-Phen/PU	-0.52	1.45×10^{-8}	3097	203	-211