

Supporting Information

In vitro corrosion behavior and biocompatibility of biodegradable Mg-Mn-Zn alloy modified with a three-layer MOF/3D rGO/PCL coating

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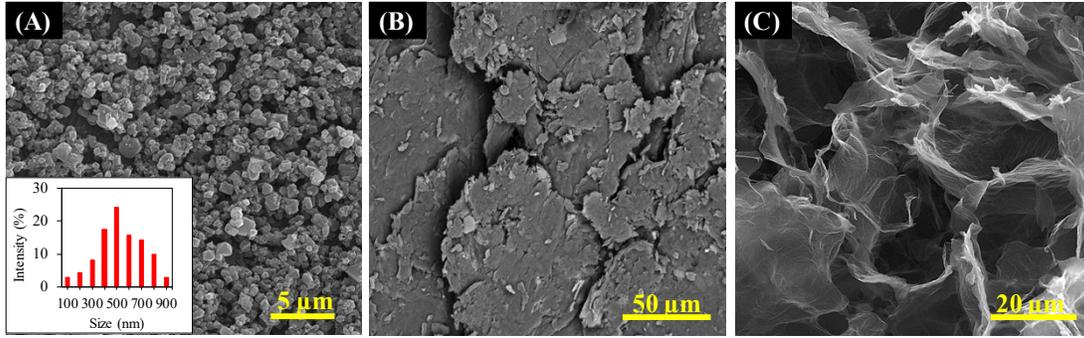


Fig. S1: FE-SEM images of A) MIL-100 (Fe) MOF, with the inset shows particle size distribution histogram of the synthesized MOF, B) graphene oxide (GO) and C) 3D reduced graphene oxide (3D rGO).

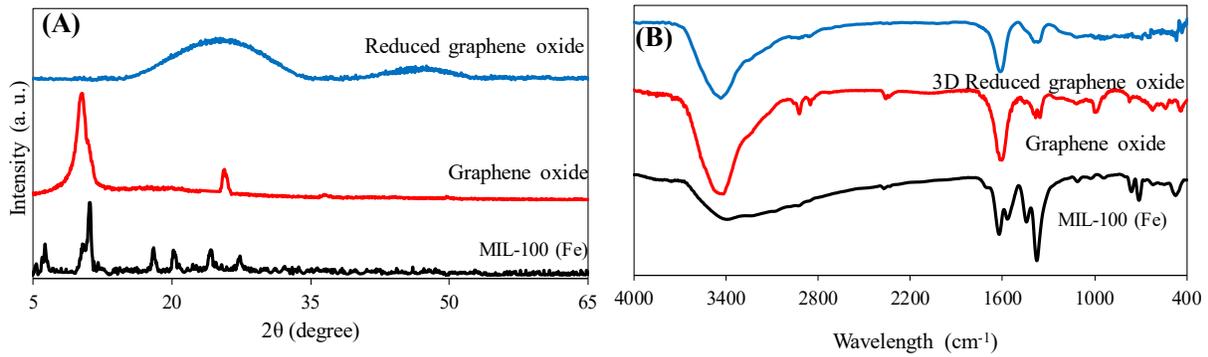


Fig. S2: A) XRD patterns of MIL-100 (Fe) MOF, GO and 3D rGO. B) FT-IR spectra of MIL-100 (Fe) MOF, GO and 3D rGO.

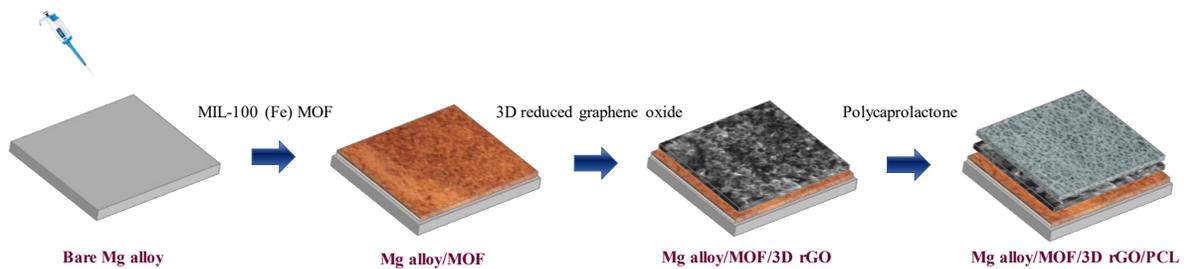


Fig. S3: Illustrating the sequential formation stages of the three-layer MOF/3D rGO/PCL coating on the Mg surface using the layer by layer method.

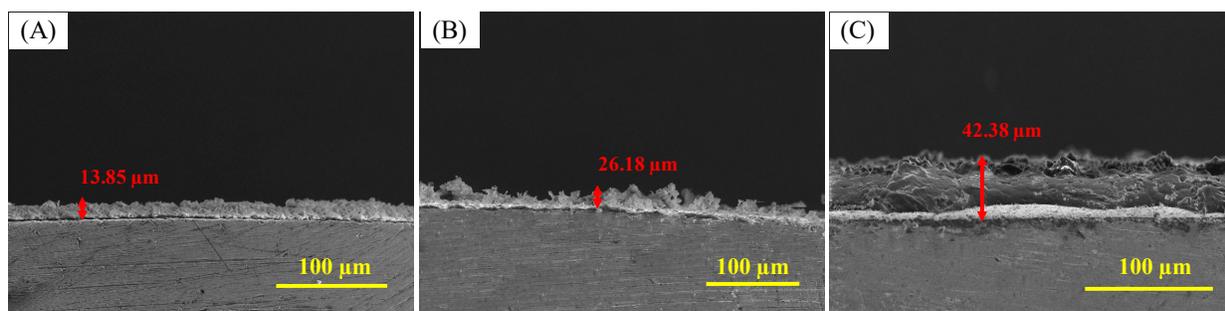


Fig. S4. Cross-sectional SEM images of A) MOF coating on the Mg alloy, B) MOF/3D rGO coating on the Mg alloy and C) MOF/3D rGO/PCL three-layer coating on the Mg alloy.

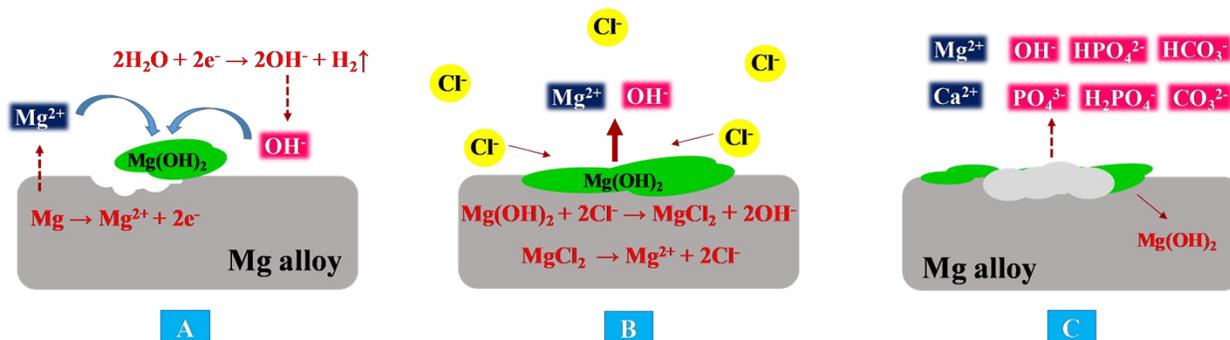


Fig. S5. Schematic representation of the reactions of the Mg alloy in the SBF solution: A) initial stages of the Mg alloy corrosion accompanied by the formation of a $\text{Mg}(\text{OH})_2$ layer on its surface, B) partial dissolution of the $\text{Mg}(\text{OH})_2$ layer and C) formation of various phosphate and carbonate deposits on the surface of the Mg alloy.

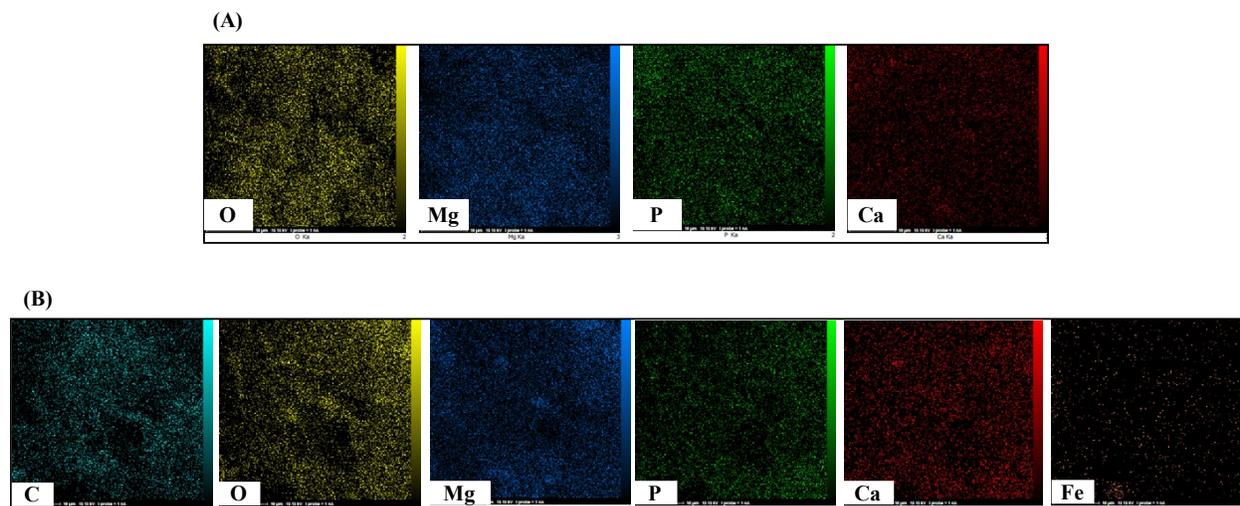


Fig. S6. Elemental mapping of A) the Mg alloy and B) the Mg alloy coated with three-layer of MOF/3D rGO/PCL. All experiments were conducted after immersing the samples in SBF solution for 21 days.

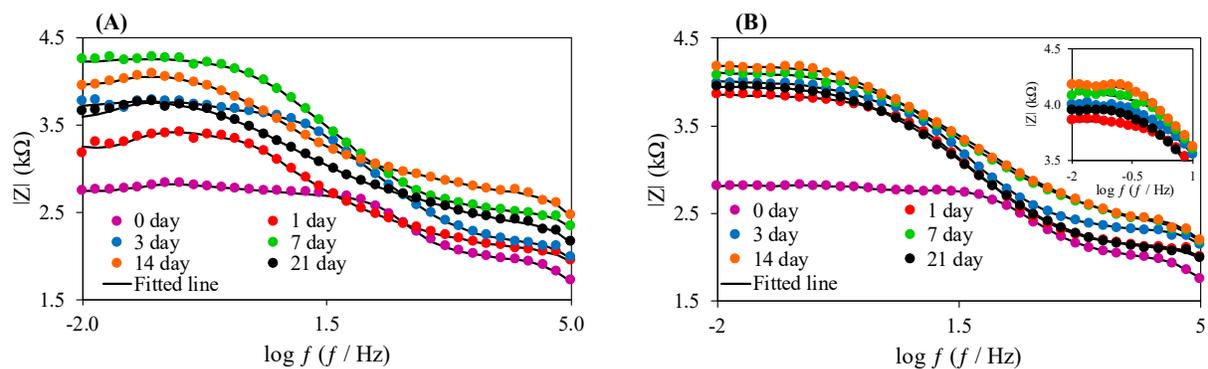


Fig. S7. Bode plots of A) Mg alloy and B) MOF/3D rGO/PCL three-layer coated Mg alloy after immersion in the SBF solution for various durations of 0, 1, 3, 7, 14 and 21 days at 37°C .

Table S1: The results obtained from the Tafel plots of the Mg alloy and the Mg alloy coated with three-layer of MOF/3D rGO/PCL after immersion in SBF solution for different times at 37°C.

Sample	Immersion time (day)	E_{corr} (V vs. SCE)	J_{corr} ($\mu\text{A cm}^{-2}$)	CR (mpy)	IE%
Mg alloy	0	-1.61	116.8	106.1	—
	1	-1.43	20.5	18.6	—
	3	-1.38	16.4	14.9	—
	7	-1.36	10.2	9.3	—
	14	-1.35	10.5	9.5	—
	21	-1.42	20.3	18.4	—
Coated Mg alloy	0	-1.43	7.4	6.7	93.7
	1	-1.42	6.3	5.7	94.6
	3	-1.38	5.4	4.9	95.4
	7	-1.35	4.1	3.7	96.5
	14	-1.35	3.1	2.8	97.3
	21	-1.37	4.6	4.2	96.1