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Layered double hydroxide/poly-dopamine composite coating with surface heparinization on Mg alloy: improved anticorrosion, endothelialization and hemocompatibility

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1. Additional experimental method

1.1 EDS mapping of surface coatings

Scanning maps of Mg, O, Al and C were measured by EDS.

1.2 Measurement of contact angle

The water contact angles were measured on an optical contact angle system (Model SL200A/B/D) at ambient temperature using a 3 μL deionized water droplet.

1.3 Cytotoxicity evaluation

Human umbilical vein endothelial cells (HUVECs, ScienceCell, USA) were used in the test. After sterilized by ultraviolet irradiation, the samples were incubated in Endothelial Cell Medium (ECM) for 24 h and the sample-area-extraction-medium ratio was 0.5 cm^2/mL. The extracted solution was designated as 100%, and was diluted to 60% and 30% with ECM medium. Meanwhile, 100 μL cell suspensions with a cell density of 5×10^4 cell/mL were added to each well of a 96-well culture plate. After 24 h, 100 μL extracted solution with different concentrations replace the culture medium and incubated for another 3 days. ECM medium without extract served as the control group. Cells number was tested by the alamarBlue assay (AbD Serotec Ltd, UK) according to the manufacturer's instruction.

2. Additional results and discussion

The scanning maps of Mg, O, Al and C of all treated samples are displayed in Figure S1. The intensity of O element of PDA samples was fewer than the other samples. Because some C element in the air and carbonate in the interlayer of Mg-Al

LDH, few C element were also detected on the surface of LDH sample. Much more C element was detected on PDA, LDH/PDA and LDH/PDA/HEP samples. And all the elements were uniform distribution on the samples' surface.

The contact angles of different samples are shown in Figure S2. AZ31 and LDH sample showed a decreased contact angle after coated with poly-dopamine. For LDH/PDA sample, further modified with heparin would lead to a larger contact angle.

In many literatures, cell viability is evaluated via culturing cells in extract. In the present study, HUVECs were also cultured with different extract. It was found that, in the extract of LDH, LDH/PDA and LDH/PDA/HEP, cells showed the same level of viability, which was about 80% (Figure S3). The result indicated that the short-term extract of LDH, LDH/PDA and LDH/PDA/HEP samples do a same effect to HUVECs, thus it could be concluded that the surface properties was mainly responsible for the different adherence process and migration of HUVECs on different samples.

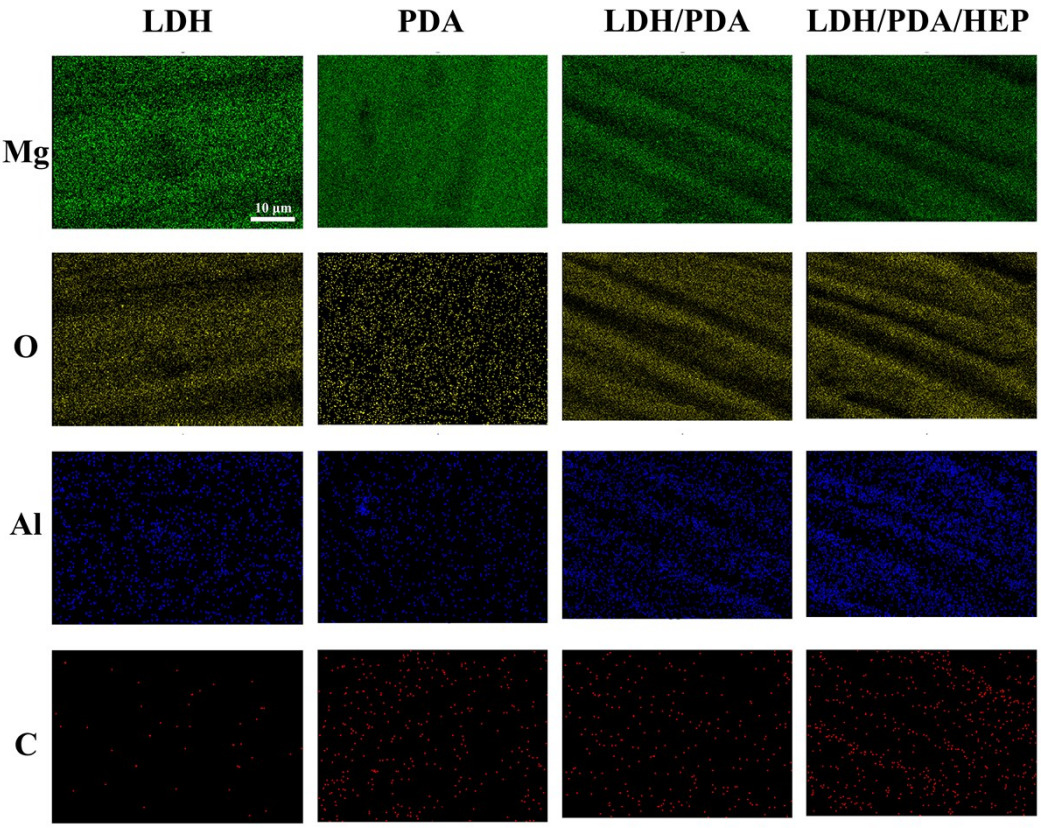

Figure S1. Scanning maps of Mg, O, Al and C elements of all treated samples.

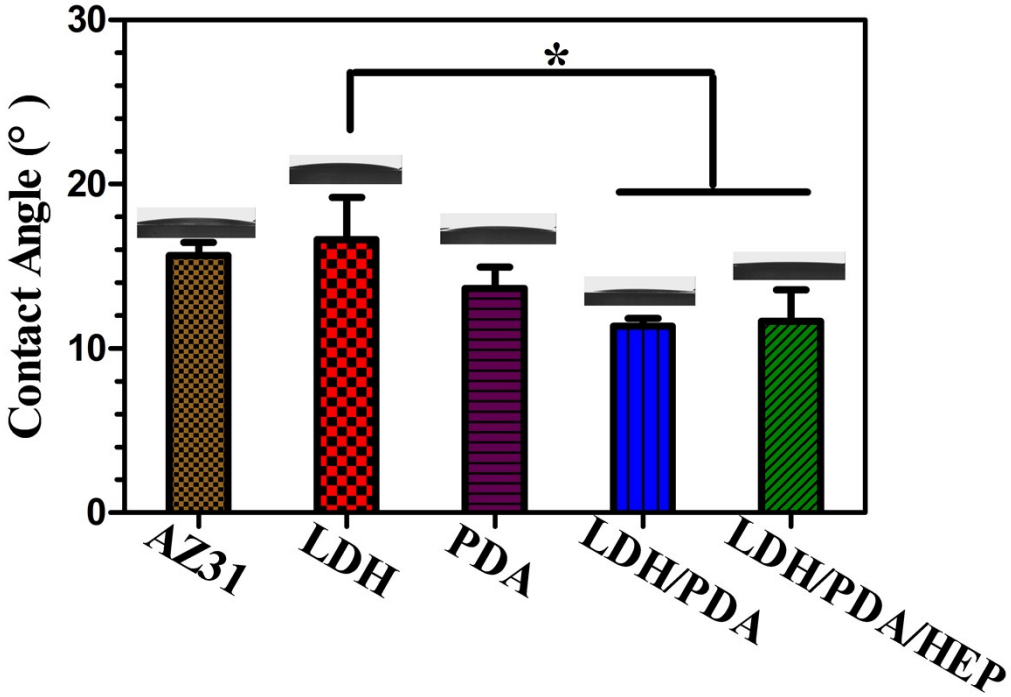

Figure S2. The water contact angles of different samples.

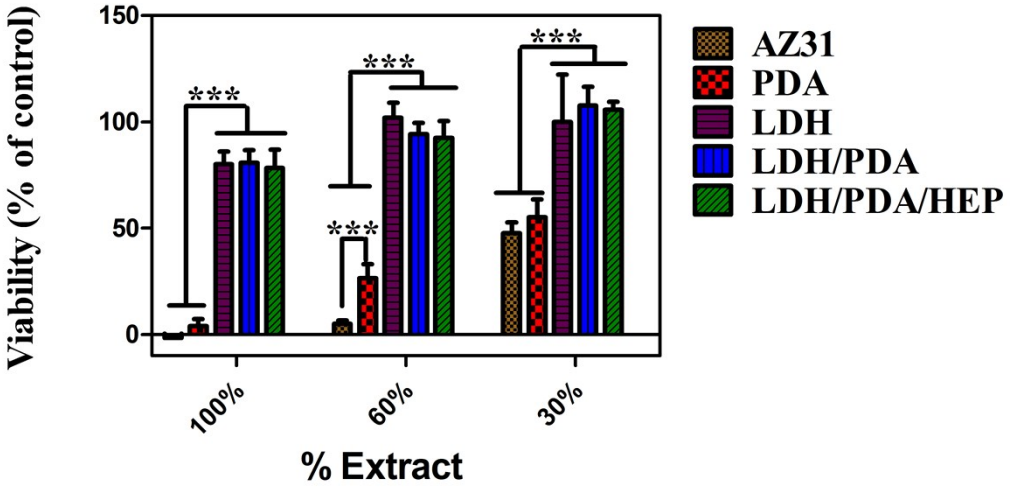

Figure S3. Viability of HUVECs incubated for 3 days with different concentration extracts of AZ31, PDA, LDH, LDH/PDA and LDH/PDA/HEP.