Support information

Experimental section

Degradation of PTLDH *in vivo*

According to the method described in the section of *Hydrogel preparation and characterization*, the Rhodamine B labeled PTLDH was fabricated with the addition of 1mg covalent of BSA and Rhodamine B. Then, the prepared fluorescent hydrogels were implanted into the mice. At the predetermined time point, the mice were anaesthetized for the evaluation of residual fluorescence intensity *via* multi-mode optical living body imaging system (IVIS Lumina XRMS Series III PerkinElmer). The parameters of fluorescence imaging were as follows: Excitation wavelength was 540 nm, emission wavelength was 620 nm, and exposure time was 1 s. In addition, the degradation kinetics of PTLDH *in vivo* was further understood by software statistics of Rhodamine B intensity.

Release kinetics of tumor antgens in PTLDH

To further investigate the release of tumor antigens from PTLDH, we prepared personalized hydrogels using Panc02 cell lines expressing mode antigen OVA. The hydrogel was fabricated in the same way as described the section of *Hydrogel preparation and characterization*. Then, 200 μL of PTLDH containing OVA were immersed into 2 mL 1× PBS buffer under a shaking speed of 40 rpm at 37 ℃. The aliquots of 100 μL in the buffer were taken out with an equal volume of fresh buffer instead every three day. The collected samples were analyzed by OVA elisa kit for the evaluation of tumor antigens releasement.

Function of $CD8^+$ T cells in spleen after treatment

To analyze the effect of the formulations on T cell function in the spleen of mice, the mice were euthanized on day 7 to separate the spleen for the analysis of $CD8^+$ T cells. The separated $CD8^+$ T cells were labeled with 2 μM CFDA-SE, and then incubated with Panc02 tumor cells at a ratio of 2:1 for 24 h at 37 ℃. The proliferation was determined by the flow cytometry. Meanwhile, the supernatant was collected for the evaluation of TNFα secretion.

Hematology evaluations

To evaluate the systemic toxicity of PTLDH, blood were collected in the tubes at the end of treatment. The serum were separated from the blood at the centrifugation of 1000 × g for 15 minutes. Then, the serum were used for analysis of liver and kidney toxicity. The biochemical parameters including aspartate amino transferase (AST), alanine amino transferase (ALT), alkaline phosphatase (ALP) creatinine (CREA) and creatine kinase (CK) in the serum were evaluated with Cobas501 automatic hematology analyzer (Roche, USA).

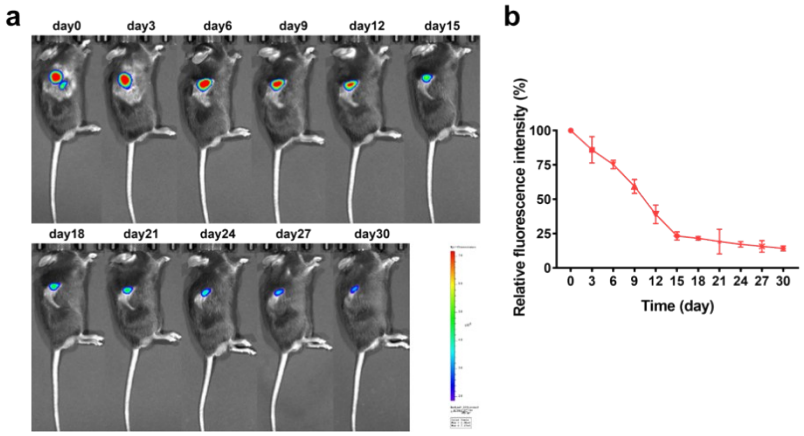

Figure S1. Fluorescence imaging (a) and quantification (b) of Rhodamine labeled PTLDH in mice (n = 3 per group).

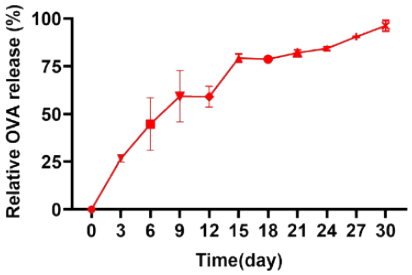

Figure S2. Accumulative release profile of OVA protein from PTLDH (n = 3 per group).

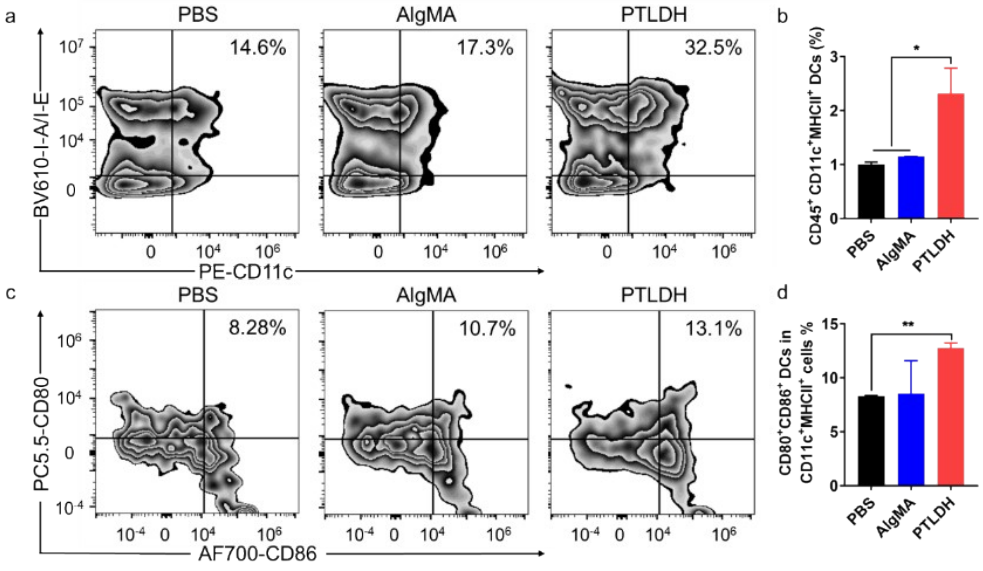

Figure S3. *In vivo* DCs maturation induced by the treatment of AlgMA alone and PTLDH alone. Flow cytometry analysis (a) and statistic (b) of $CD45^+CD11c^+MHCII^+$ DCs. Flow cytometry analysis (c) and statistic (d) of $CD80^+CD86^+$ DCs in $CD11c^+MHCII^+$ cells (n = 4 per group). *P< 0.05, **P< 0.01.

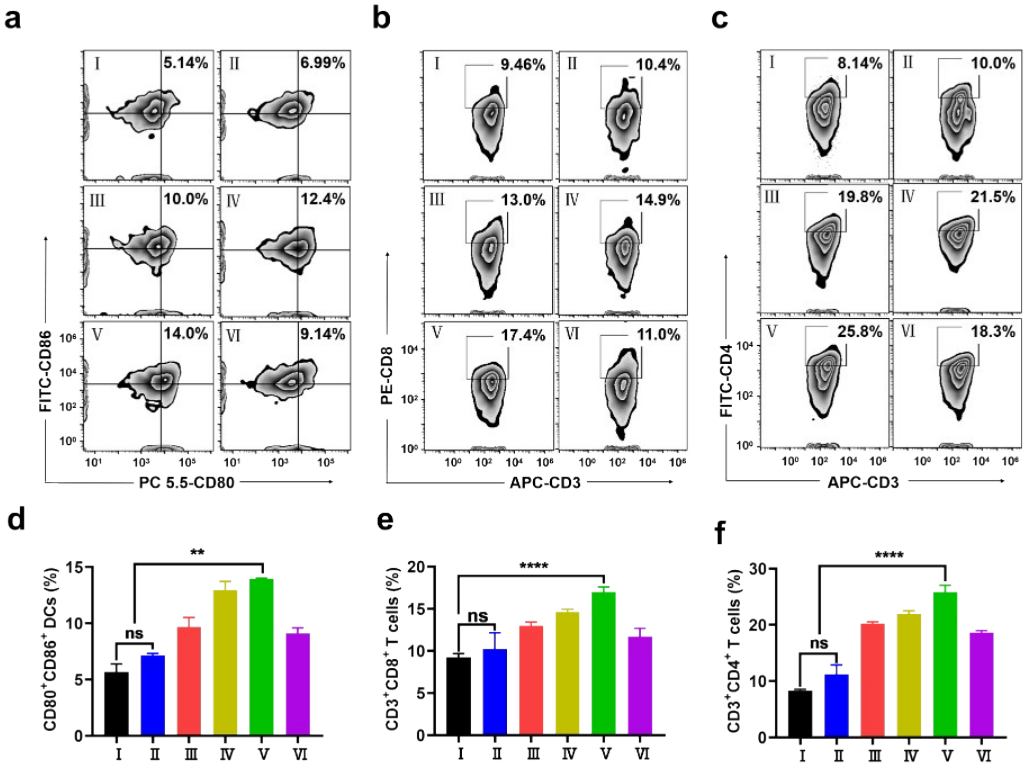

Figure S4. *In vivo* inhibition of tumor recurrence in 7 days after the treatment. Representative flow cytometry analysis of matured DCs (a), $CD8^+$ (b) and $CD4^+$ T cells (c) after the treatment of different therapeutics. The statistics of matured DCs (d), $CD8^+$ T (e) and $CD4^+$ T cells (f). I: PBS group, II: AlgMA group, III: PTLDH group, IV: PTLDH/GM-CSF group, V: PTLDH/GM-CSF/αPD-L1 group, VI: αPD-L1 group (n = 4 per group). **P< 0.01, ***P< 0.001.

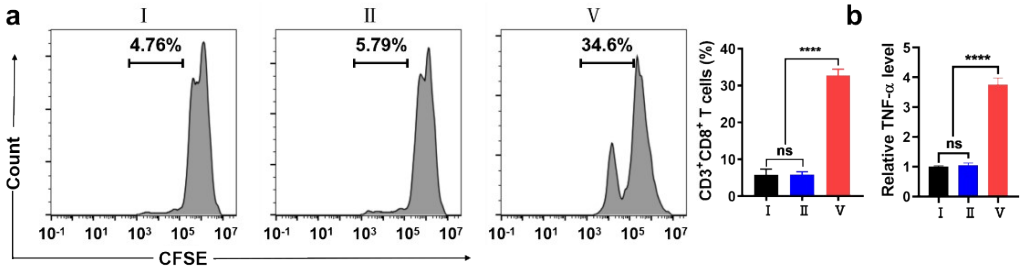

Figure S5. $CD8^+$ T cells proliferation (a) and TNFα secretion (b) in the spleen of mice after treatment. I: PBS group, II: AlgMA group, V: PTLDH/GM-CSF/αPD-L1 group (n = 4 per group). ****P<0.0001.

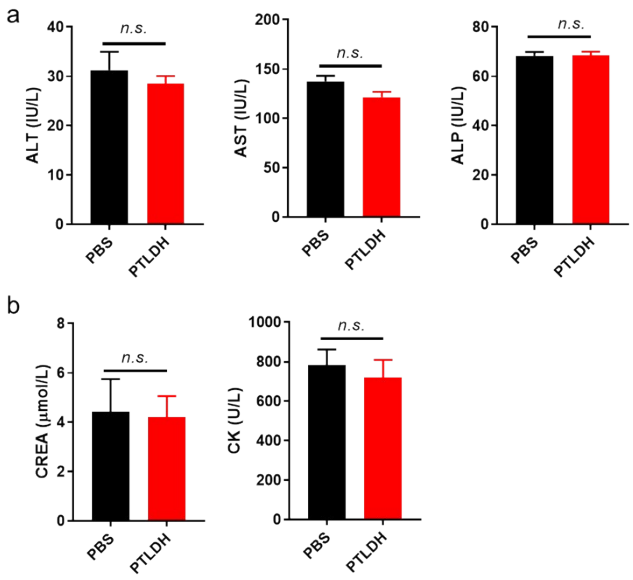

Figure S6. Hematology evaluations. (a) Liver toxicity evaluated using values of alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP) in the serum. (b) Kidney toxicity evaluated using creatinine (CREA) and creatine kinase (CK) in the serum (n = 3 per group) *n.s.* = no significance.