Amino Modified Polymer Nanoparticles as Adjuvants to Active Complement System and Improve Vaccine Efficacy *in Vivo*

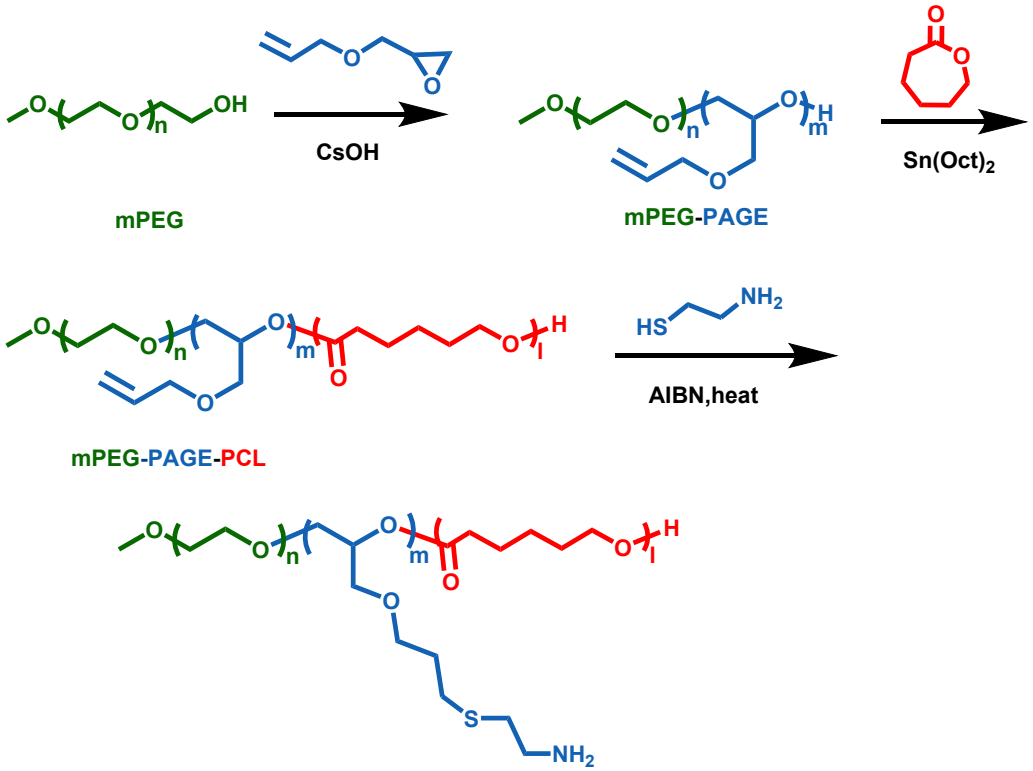
Yong Pan[1,2], Yanxin Qi[1,3*], Nannan Shao[1,2], Abegail C. Tadle[4] and Yubin Huang[1,2*]

[1]State Key Laboratory of Polymer Physics and Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, P. R. China

[2]University of Science and Technology of China, Hefei 230026, P. R. China

[3]Yanbian University Medical College, Yanji 133002, P. R. China

[4]Department of Chemistry, University of Southern California, Los Angeles, California 90089, USA



Scheme S1. Synthetic routes of thiol-ene modification of $mPEG_{5k}$-$PAGE_{15}$-PCL_{5k} triblock copolymers.

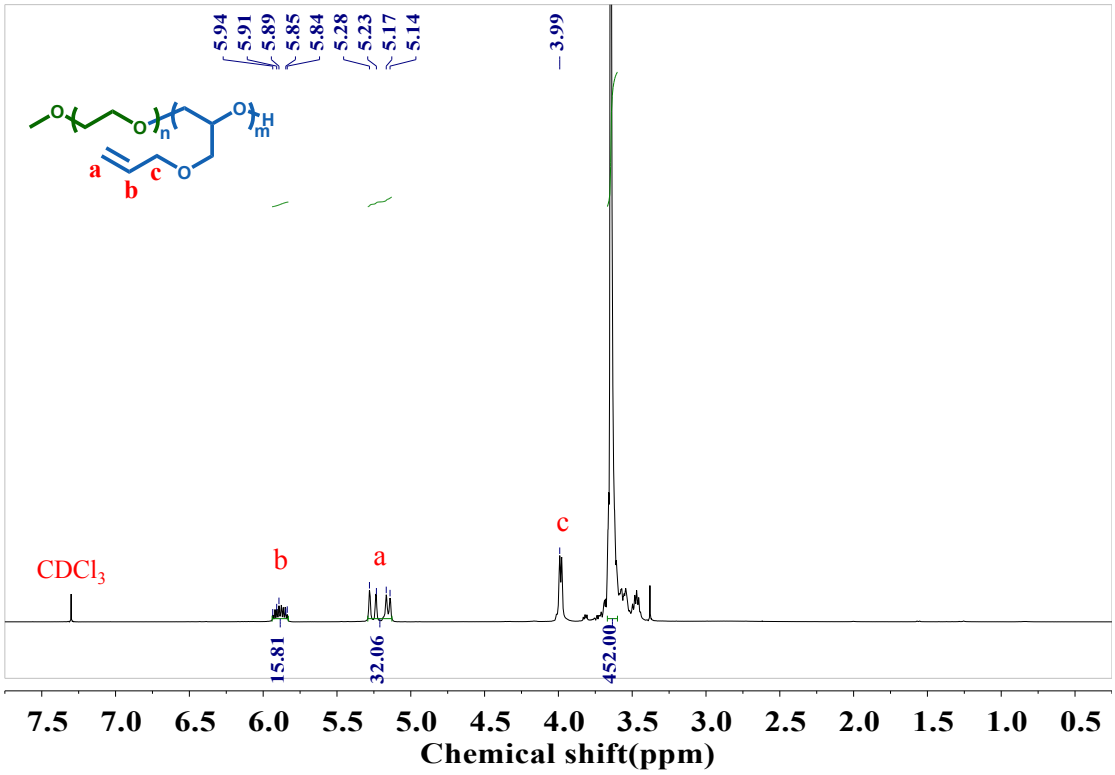


Figure S1. ^{1}H NMR spectrum of PEG_{5k}-$PAGE_{15}$ in $CDCl_3$.

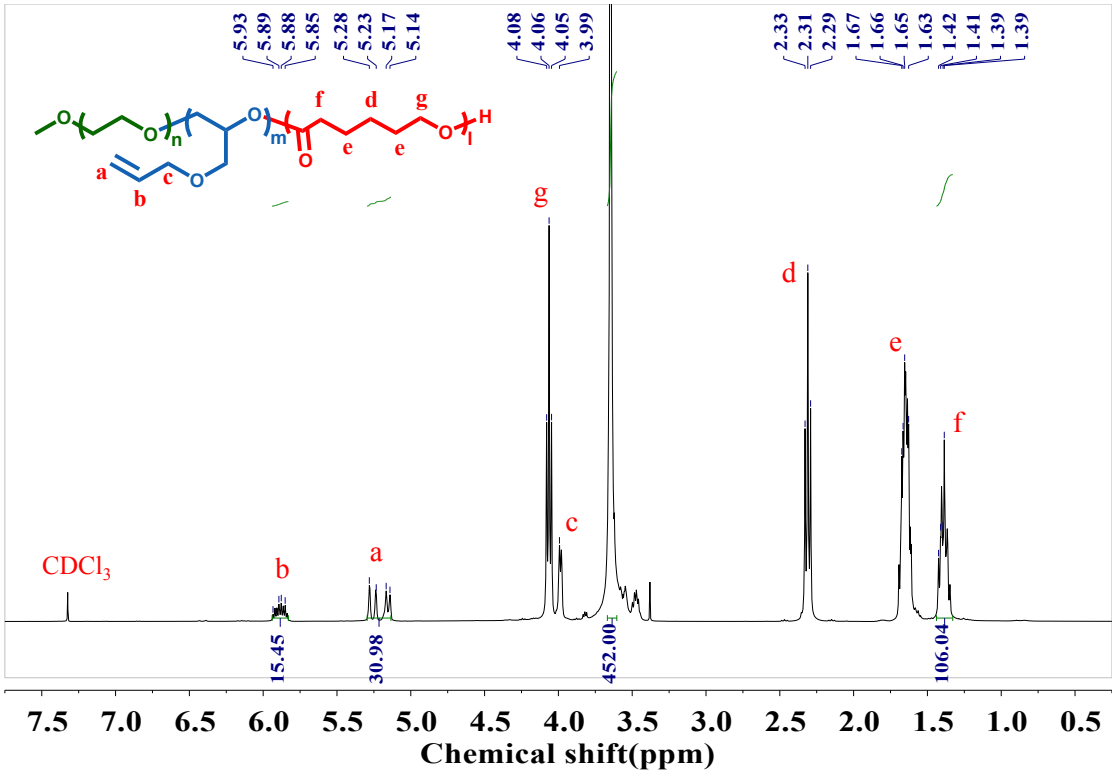


Figure S2. ^{1}H NMR spectrum of PEG_{5k}-$PAGE_{15}$-PCL_{5k} in $CDCl_3$.

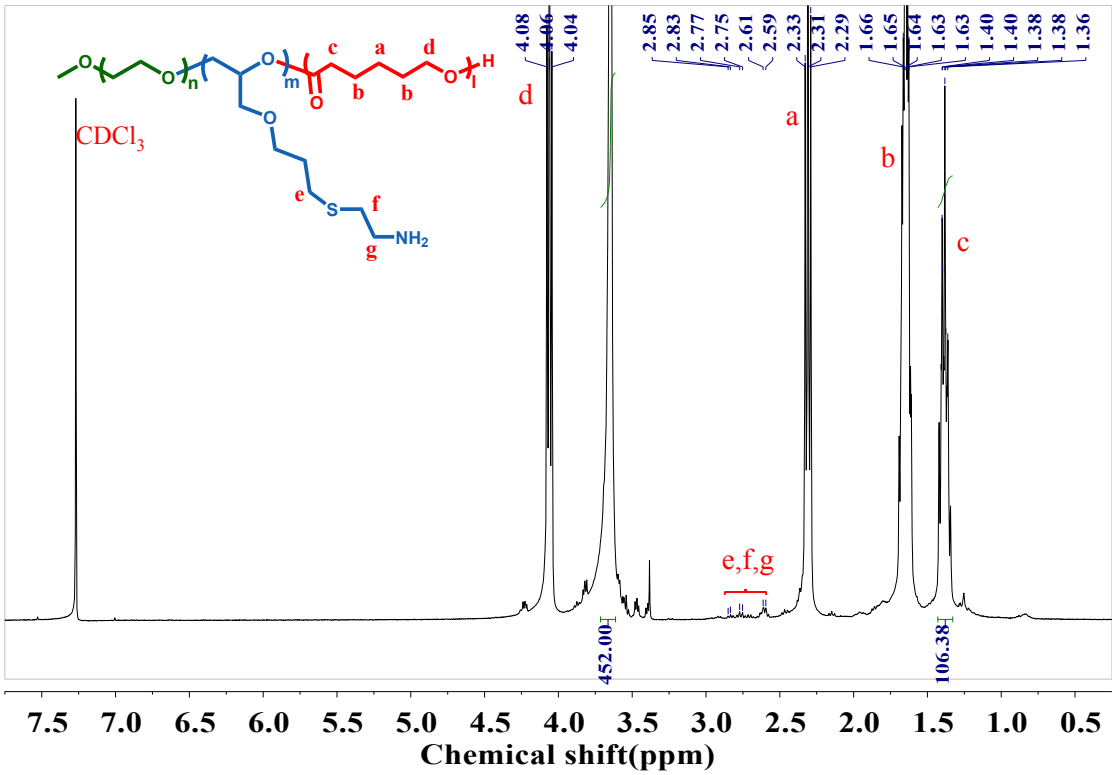


Figure S3. ^{1}H NMR spectrum of PEG_{5k}-$PAGE_{15}(NH_2)$-PCL_{5k} in $CDCl_3$.

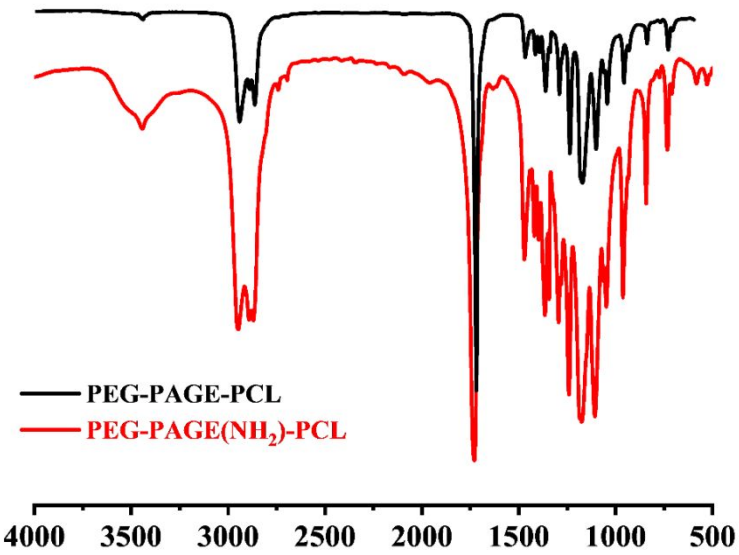
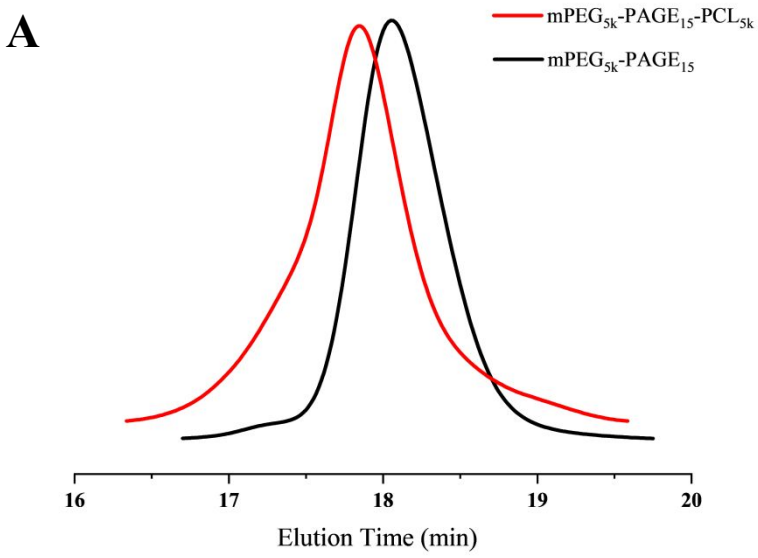


Figure S4. FT-IR spectrum of $mPEG_{5K}$-$PAGE_{15}$-PCL_{5k} and $mPEG_{5K}$-$PAGE_{15}(NH_2)$-PCL_{5k}.



B

Name	Mp	Mn (Dalton)	Mw (Dalton)	Mz (Dalton)	Mz+1 (Dalton)	Mv (Dalton)	Polydispersity
$mPEG_{5k}$-$PAGE_{15}$	8218	7554	7969	8395	8879	7908	1.0549
$mPEG_{5k}$-$PAGE_{15}$-PCL_{5k}	10580	9238	12233	15590	19648	11783	1.3242

Figure S5. (A) GPC trace of $mPEG_{5k}$-$PAGE_{15}$ and mPEG-$PAGE_{15}$-PCL_{5k} in THF solution. (B) Detailed values of $mPEG_{5k}$-$PAGE_{15}$ and mPEG-$PAGE_{15}$-PCL_{5k} molecular weight (standard: polystyrene).

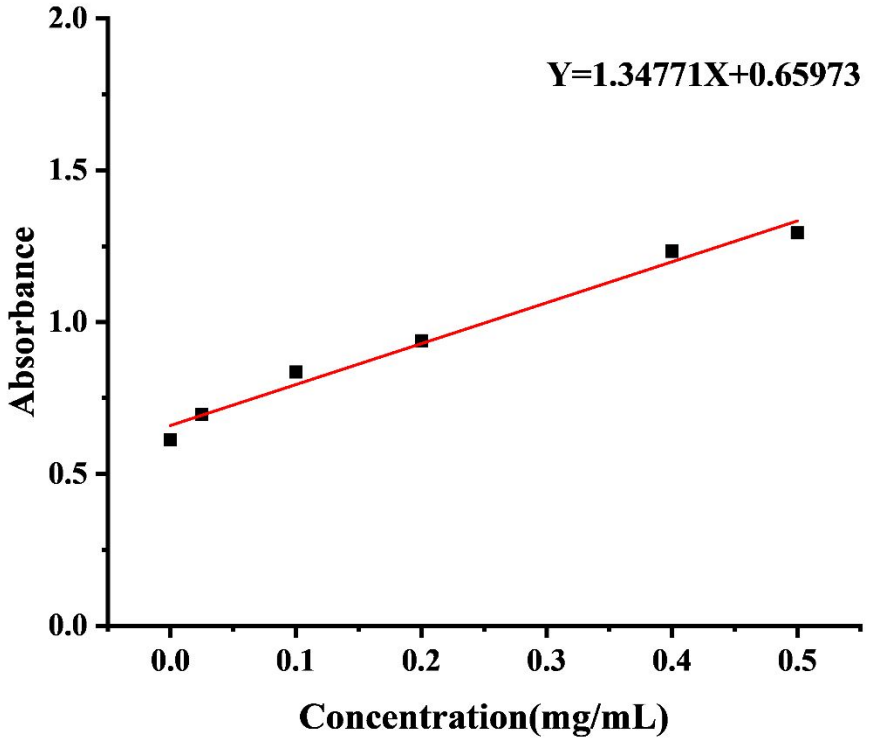


Figure S6. Standard curve of OVA in Milli-Q water(R^2=0.98242).

Table S1. The Pre-complex OVA concentration and uncomplexed OVA concentration in TPCAH@OVA.

sample	Initial concentration(mg/mL)	Supernatant concentration(mg/mL)
TPCAH@OVA	0.5	0.415347

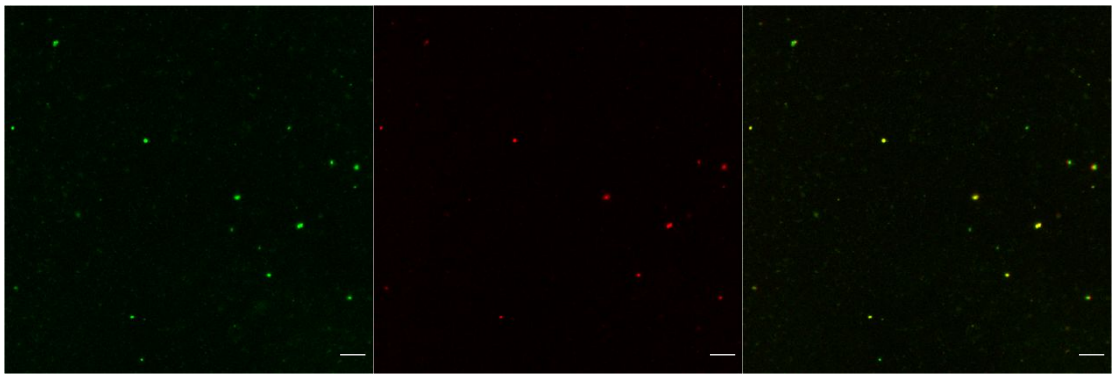


Figure S7. CLSM images of TPCAH@OVA, scale bar: 20 μm.

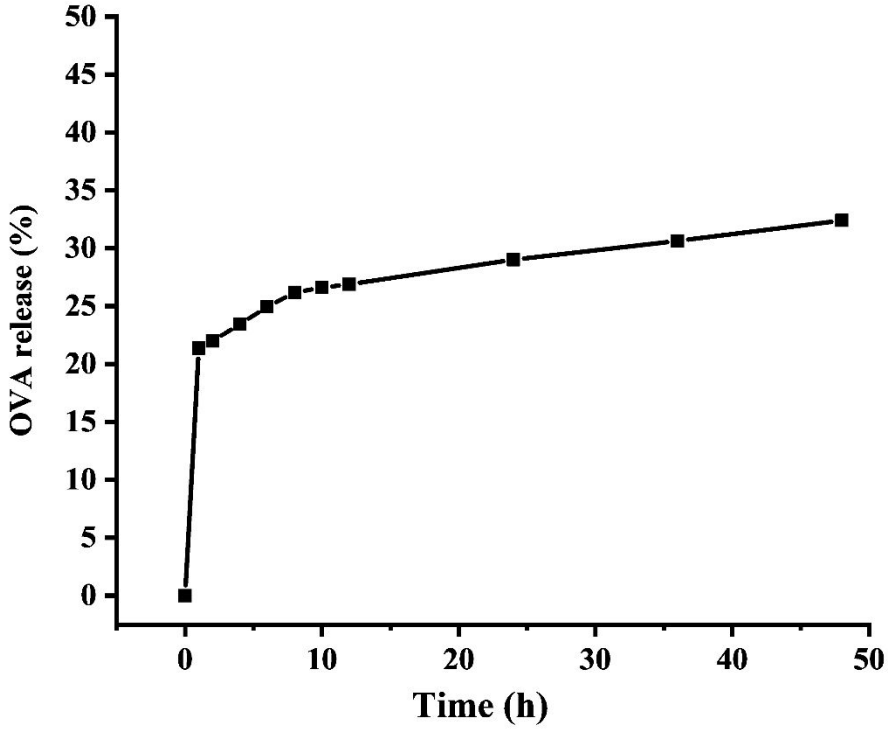


Figure S8. OVA release profiles of TPCAH@OVA in PBS (0.01M, pH 7.4).

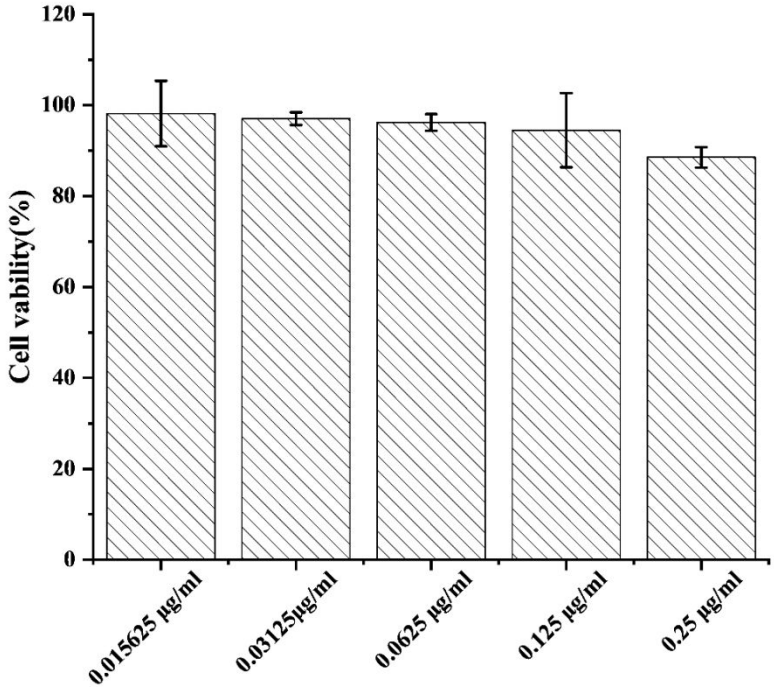


Figure S9. Cell viability of L929 cells in the presence of different concentrations of TPCAH.

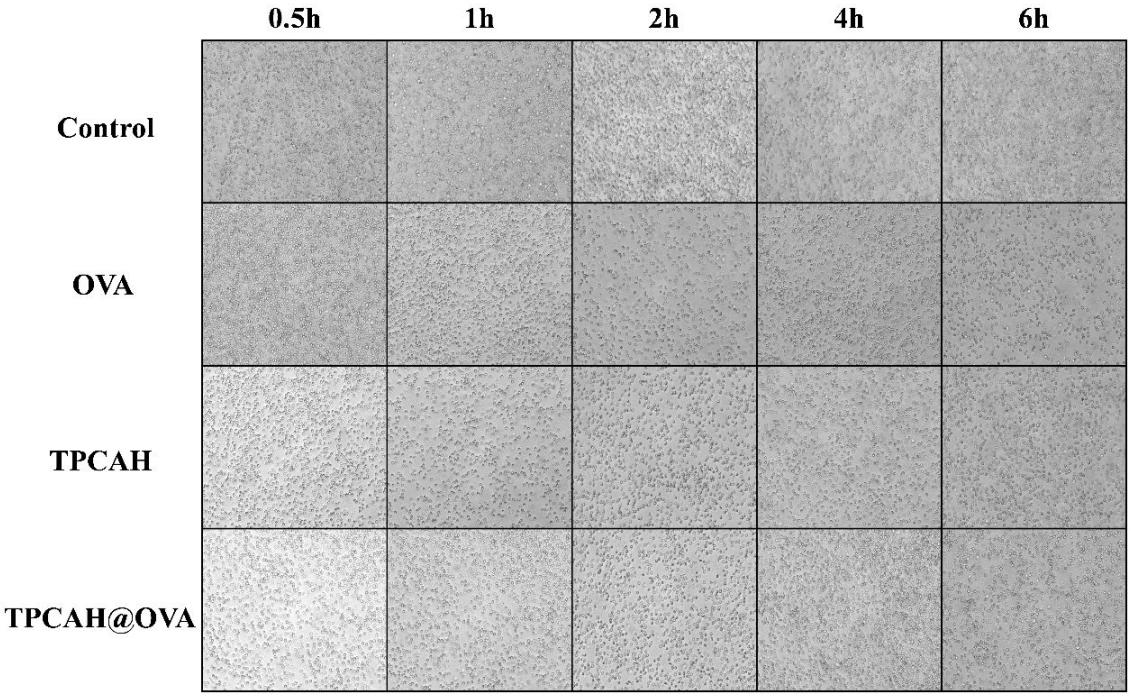


Figure S10. The morphology of RBC mixed with saline, OVA, TPCAH and TPCAH @ OVA at different time points was observed by microscopy.

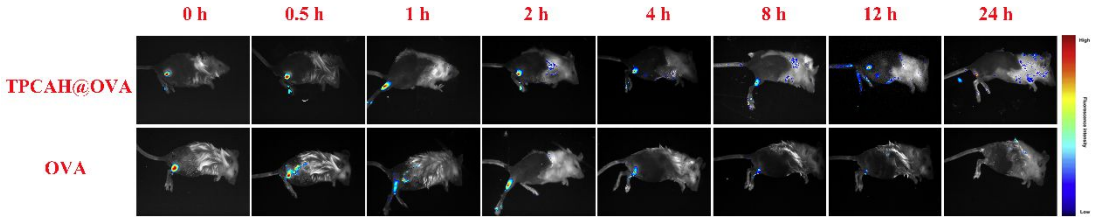


Figure S11. The fluorescence images of the OVA-FITC and TPCAH@OVA-FITC in the injection site of the immunized mice at different times.

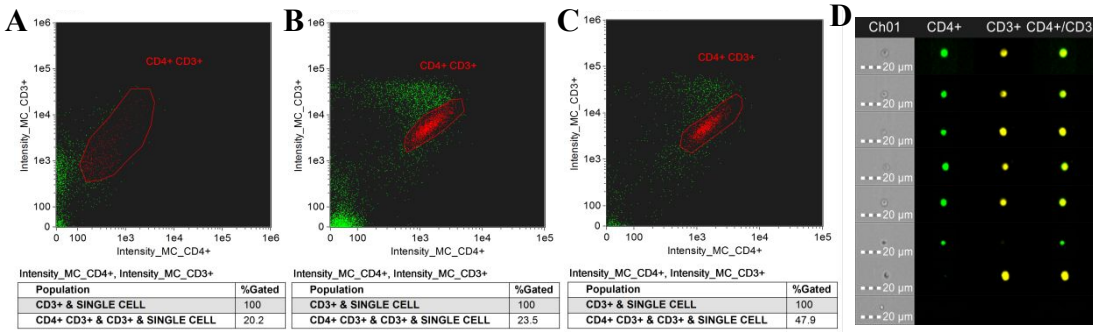


Figure S12. The FACS analysis of $CD4^+$ T cell populations (A, TPCAH; B, OVA; C, TPCAH@OVA; D, lymphocytes stained with antibodies in flow cytometry).