

Supporting Information for
**Metal-Polyphenol Nanoshells for Enhancing the
Thermostability of Single Viral Vaccine**

Qin Liu^{a,b}, Xia Zhao^a, Yuan Lin^{a*}, Zhaohui Su^{a,b*}

^a*State Key Laboratory of Polymer Physics and Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, China.*

^b*School of Applied Chemistry and Engineering, University of Science and Technology of China, Hefei 230026, China*

*Correspondence should be addressed to Yuan Lin and Zhaohui Su: 5625 Renmin Street, Changchun, Jilin, 130022, P.R. China.; Email: linyuan@ciac.ac.cn; zhsu@ciac.ac.cn. Telephone: 86-0431-85262658; Fax: 86-0431-85262126.

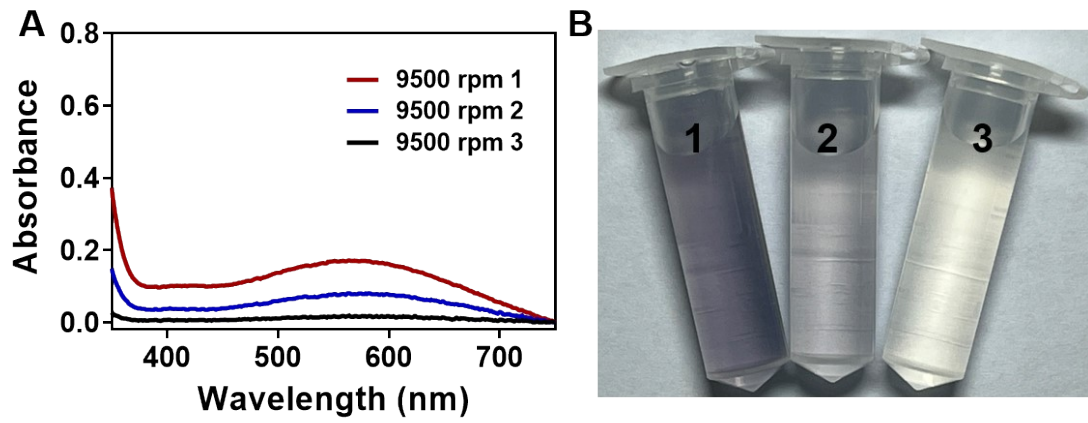


Figure S1. UV-vis absorption spectra (A) and optical images (B) of the supernatant of TMV@TA-FeIII after washed with water and centrifuged at 9500 rpm three times.

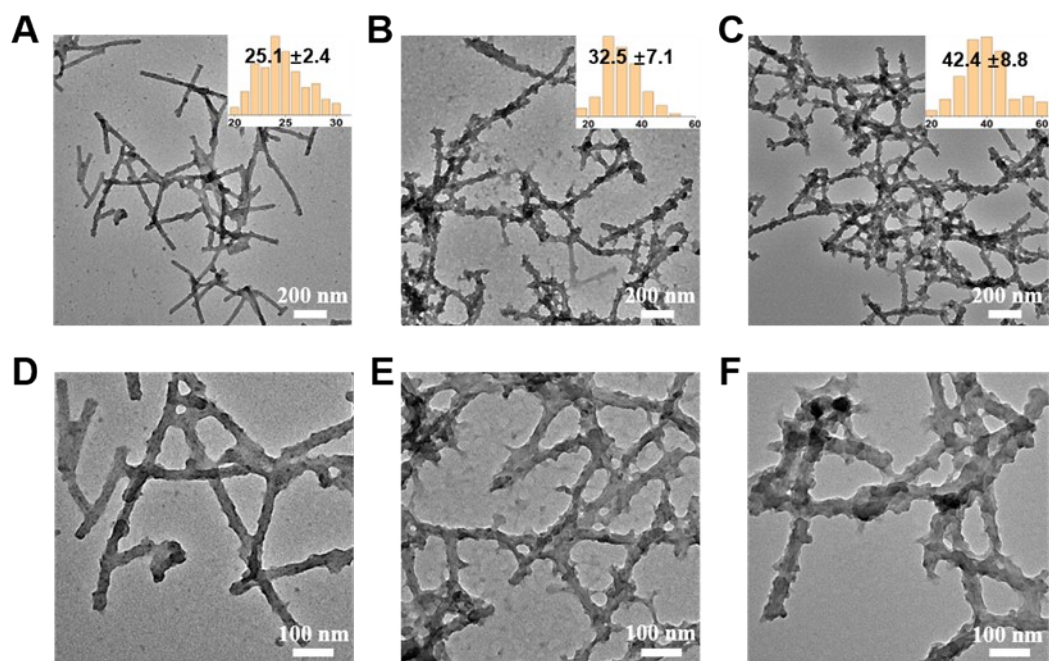


Figure S2. Morphological characterization of TMV@TA-Fe^{III} with different concentrations of Fe^{III}. (A, D) 0.15 mM (B, E) 0.30 mM and (C, F) 0.45 mM.

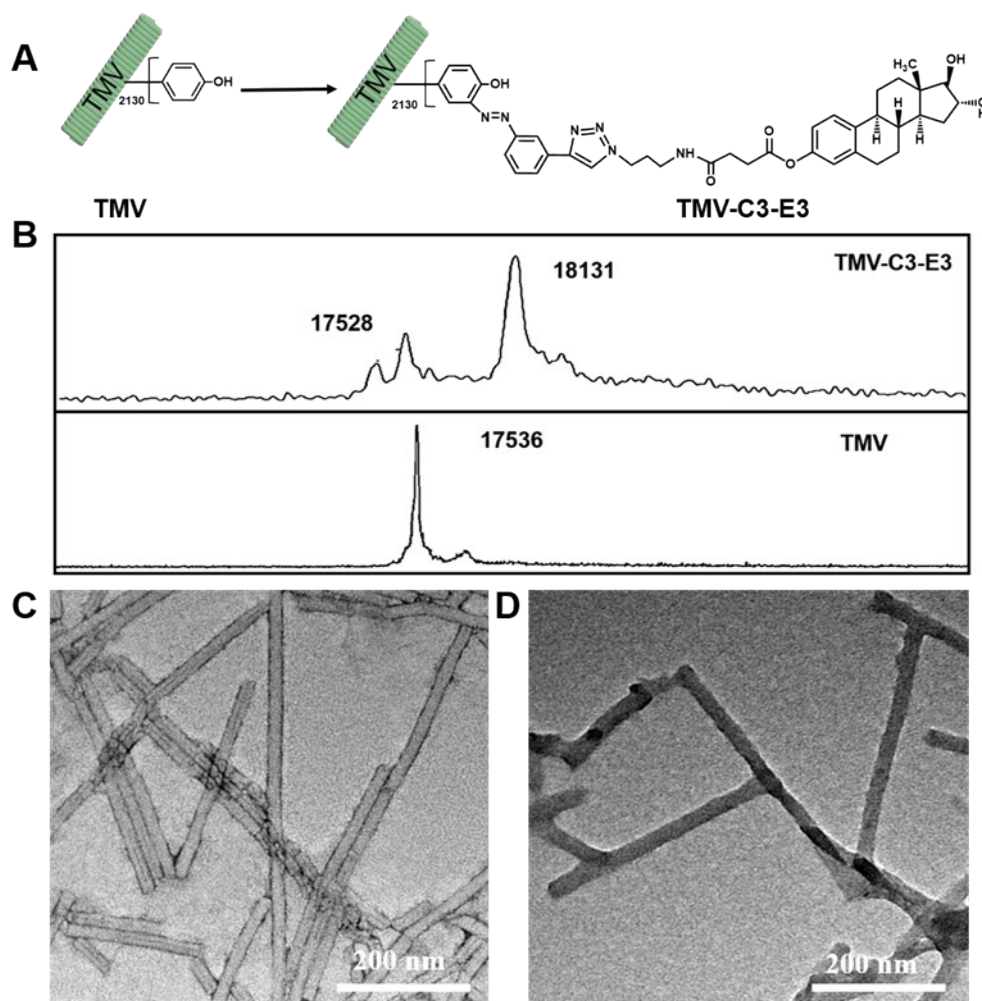
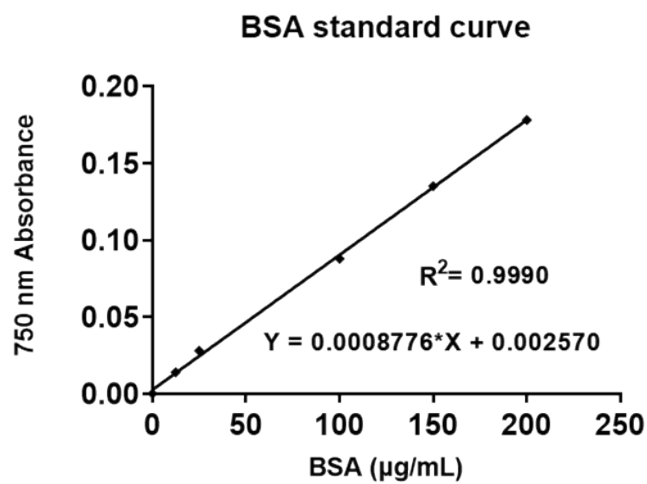


Figure S3. (A) Preparation TMV-C3-E3 conjugates by means of diazonium-coupling and CuAAC reactions. (B) MALDI-TOF MS spectra of the subunits of TMV (theoretical m/z 17534) and TMV-C3-E3 conjugates (theoretical m/z 18133). (C) TEM images of TMV-E₃ and (D) TMV-C3-E3@TA-Fe^{III}.



	Concentration ($\mu\text{g/mL}$)
TMV-wt	22.62
TMV@TA- Fe ^{III}	33.75

Figure S4. Measurement of TMV and TMV@TA-Fe^{III} concentration by Lowry kit for measuring coat protein activity. Tested after exfoliated TMV@TA-Fe with EDTA and dialyzed against water overnight to remove EDTA.

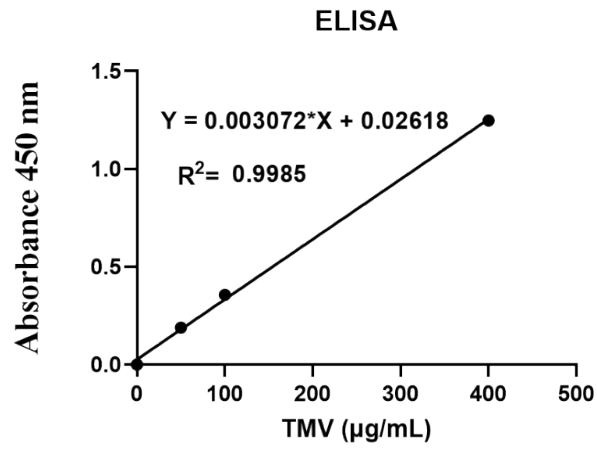


Figure S5. ELISA kit for the test of viral RNA activity.

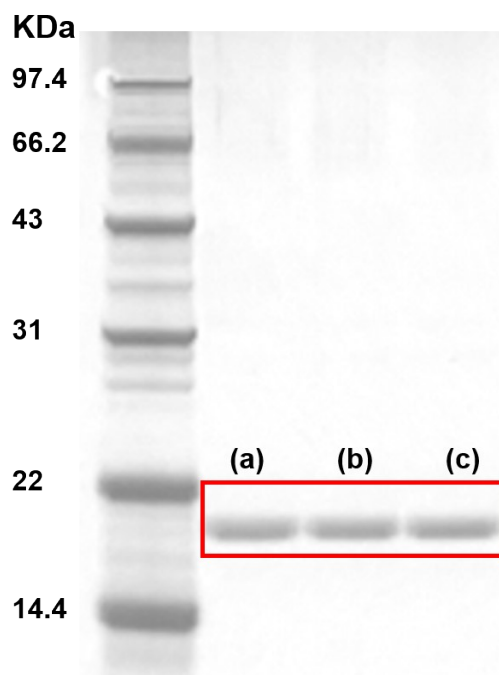


Figure S6. SDS-PAGE of TMV (a) and TMV@TA-Fe^{III} freshly prepared and exfoliated with EDTA (b), TMV@TA-Fe^{III} after heated at 37 °C for 30 days (c).