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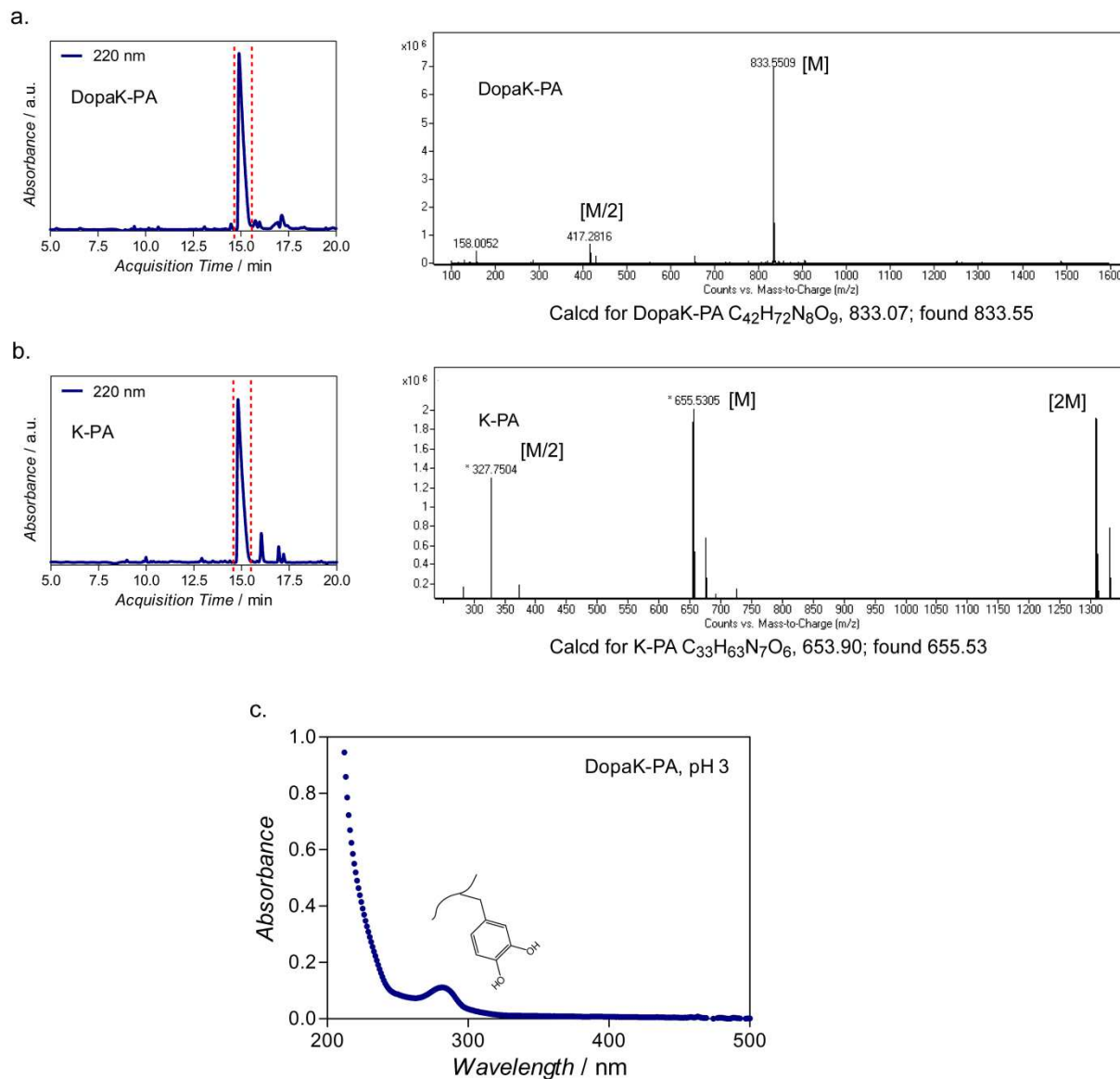
# ADVANCED FUNCTIONAL MATERIALS

## Supporting Information

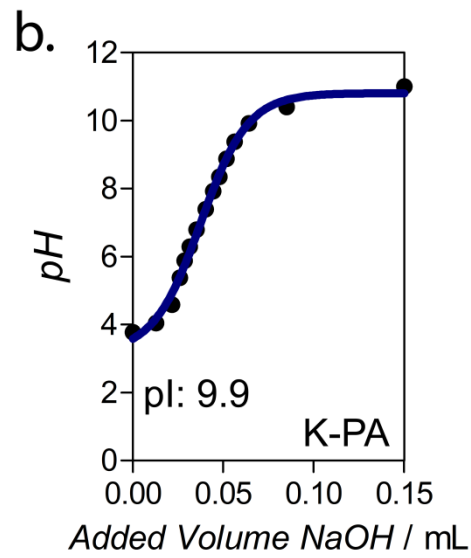
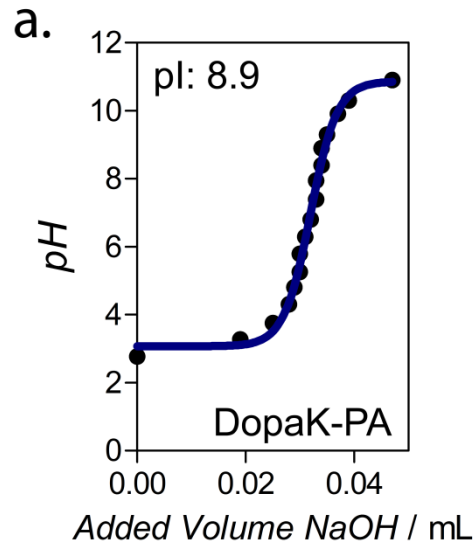
for *Adv. Funct. Mater.*, DOI: 10.1002/adfm.201202291

**Mussel Inspired Dynamic Cross-Linking of Self-Healing  
Peptide Nanofiber Network**

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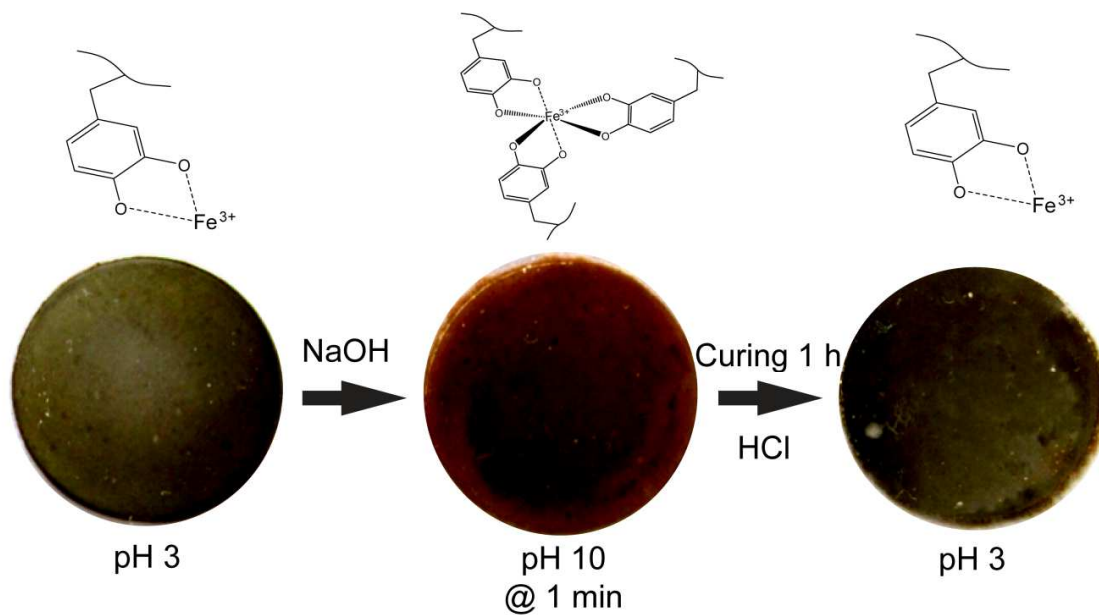


**Figure S1.** Characterization of the purity and functionality of the mussel-inspired peptide amphiphiles. a-b. Liquid chromatograms and mass spectra of DopaK-PA and K-PA, c. UV-Vis spectrum of DopaK-PA after synthesis, to show catechol groups are functional.

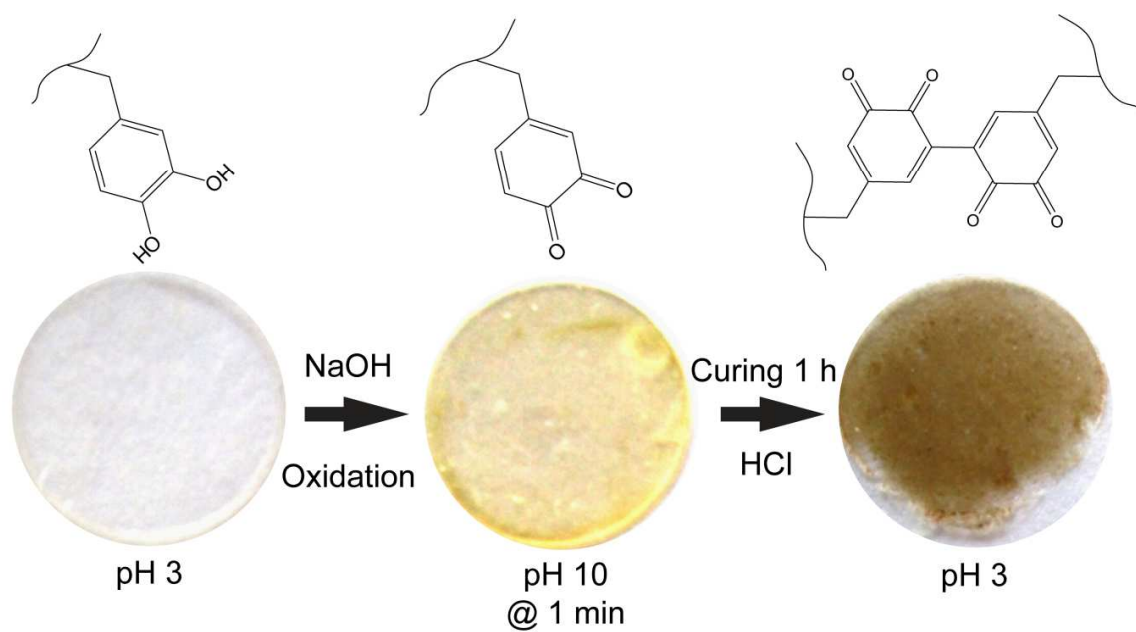


**Figure S2.** Titration of mussel inspired peptide amphiphiles with NaOH.

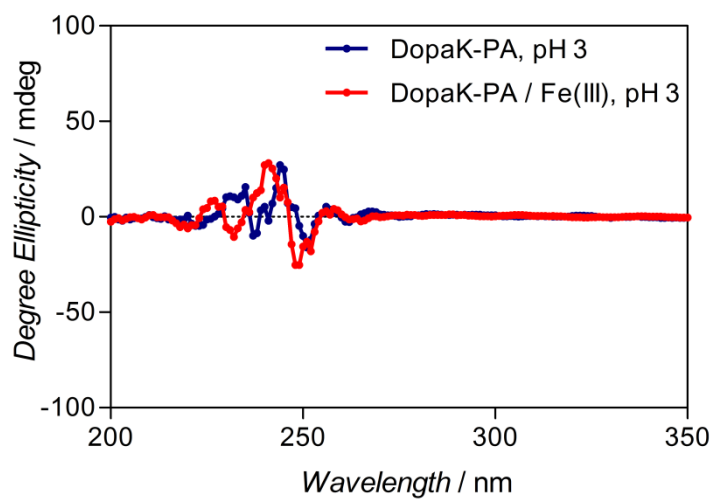
a.



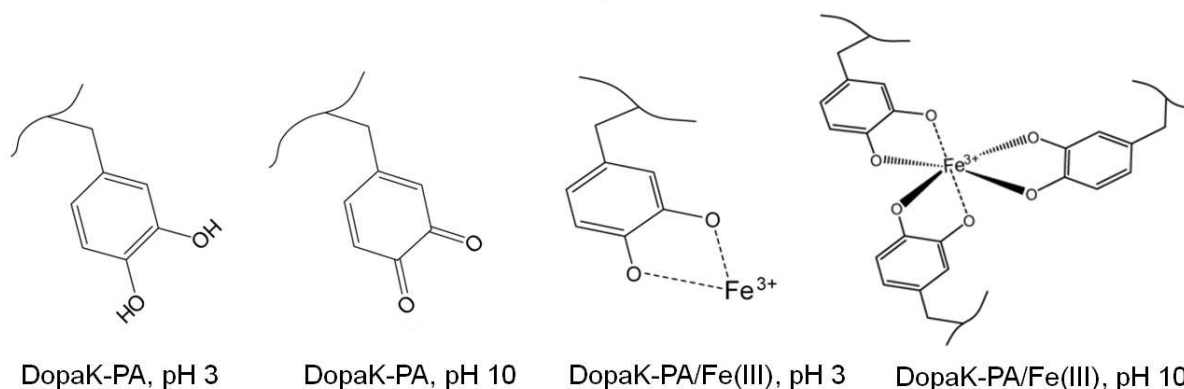
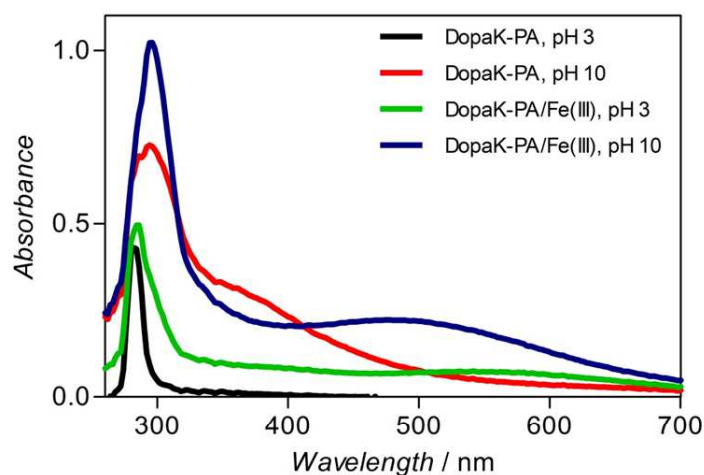
b.



**Figure S3.** pH dependent reactions of mussel inspired peptide nanofibers. Reaction schemes a. in the presence, b. in the absence of ferric iron ion.



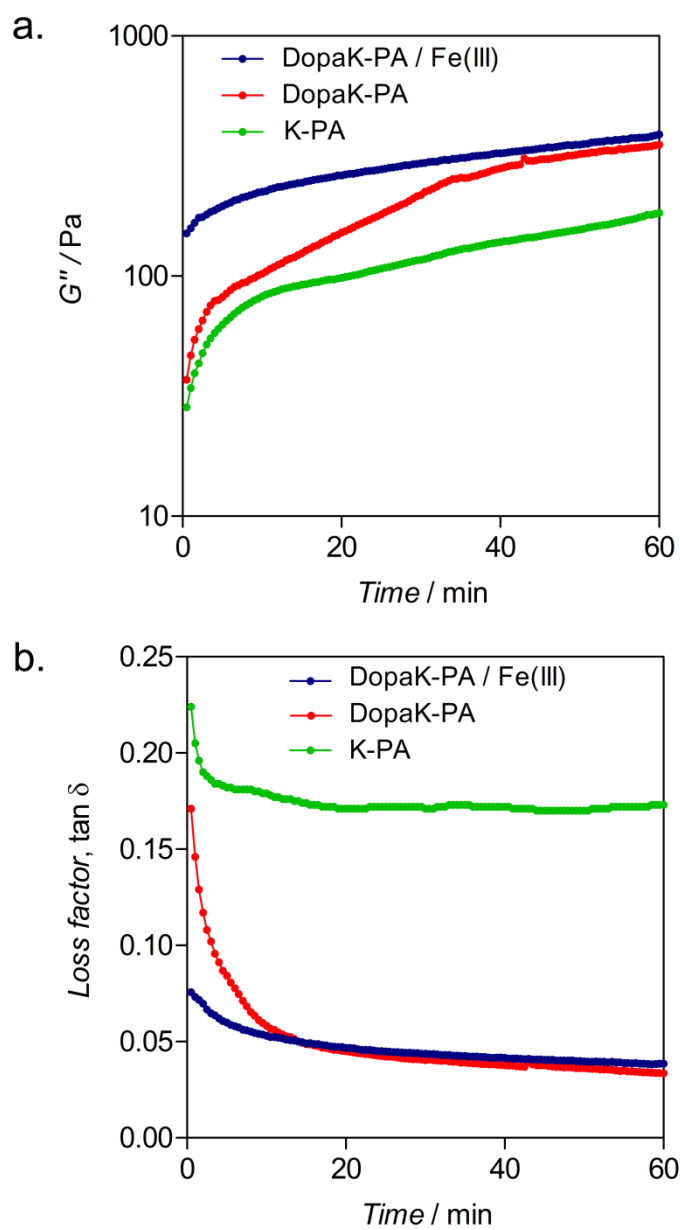
**Figure S4.** Circular dichroism spectra of DopaK-PA/Fe(III) and DopaK-PA at pH 3.



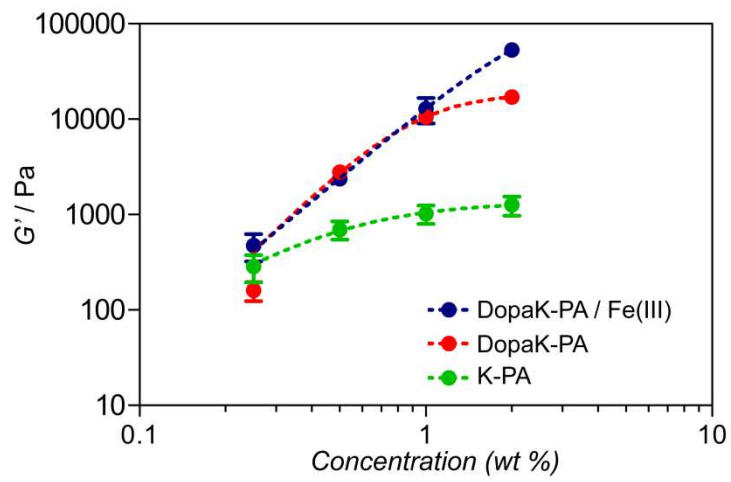
**Figure S5.** pH and Fe(III) dependent UV-Vis spectra of DopaK-PA. Oxidation of catechol to quinone through pH shift causes a new peak to appear around 386 nm.<sup>[1]</sup> This peak was not observed in the presence of iron, indicating that iron did not cause oxidation of Dopa. In the presence of iron at pH 3 a peak appears at around 520 nm, indicating monocatecholate Fe(Dopa) formation.<sup>[1,2]</sup> Upon increasing pH to ~10, this peak shifts to 520 nm corresponding to triscatecholate Fe(Dopa) formation.<sup>[1,2]</sup>

#### References

- [1] H. Xu, J. Nishida, W. Ma, H. Wu, M. Kobayashi, H. Otsuka, A. Takahara, *ACS Macro Letters* **2012**, *1*, 457.
- [2] A. Avdeef, S. R. Sofen, T. L. Bregante, K. N. Raymond, *J. Am. Chem. Soc.* **1978**, *100*, 5362.

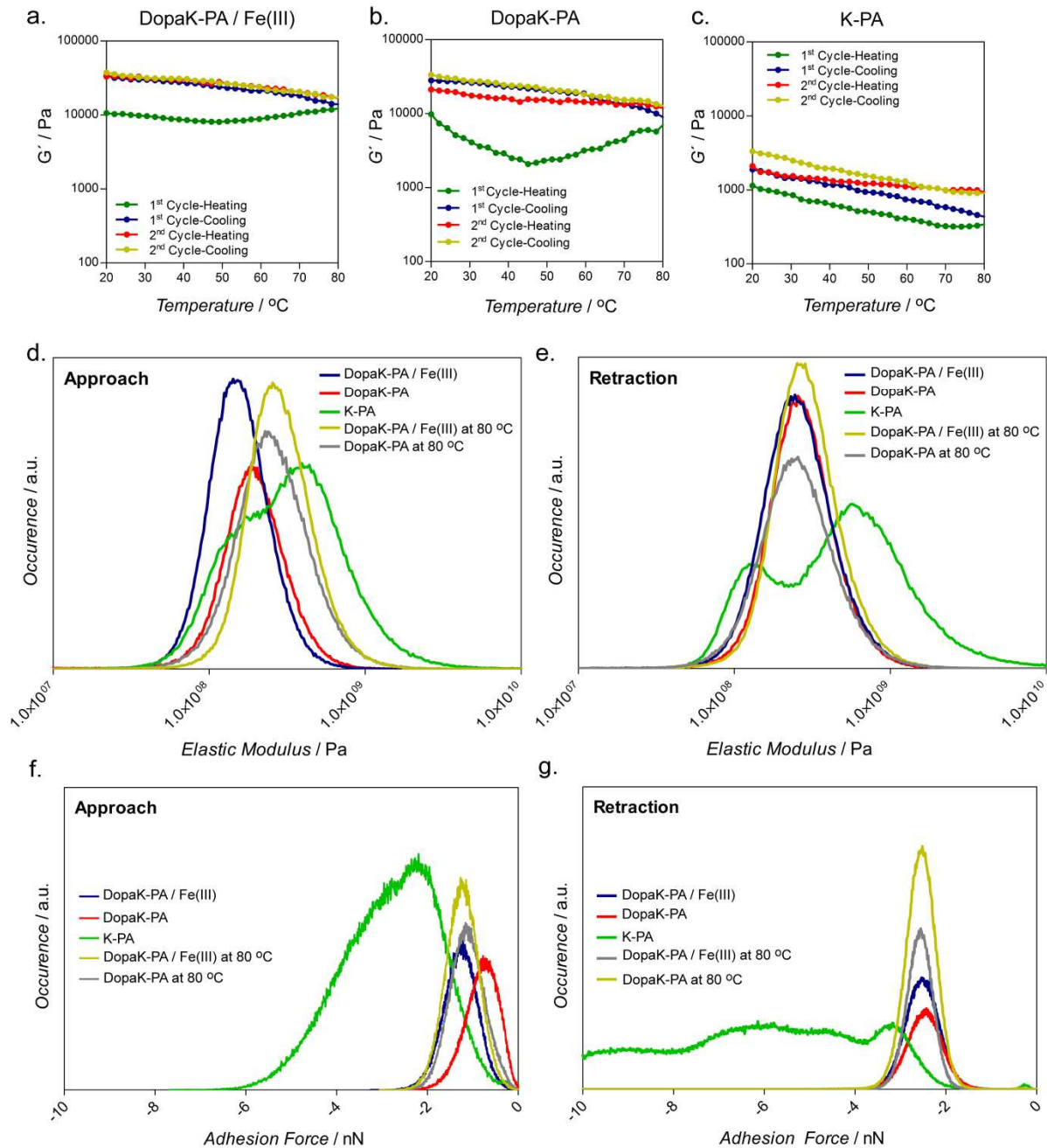


**Figure S6.** Loss modulus ( $G''$ ) and Loss (Damping) factor ( $G''/G'$ ) of DopaK-PA/Fe(III), DopaK-PA, and K-PA during gelation.



**Figure S7.** Relationship between equilibrium storage modulus and initial peptide amphiphile concentration.





**Figure S8.** Impact of temperature on the mechanical properties of peptide networks. a-c. Bulk rheological analyses of the iron cross-linked DopaK-PA/Fe(III), covalently cross-linked DopaK-PA, and noncovalent network of K-PA as a function of temperature, d-e. Elastic moduli histograms as the AFM tip approaches and retracts, f-g. Adhesion force histograms as the AFM tip approaches and retracts.