

**Biomimetic Self-Assembly of Recombinant Marine Snail Egg Capsule
Proteins into Structural Coiled-Coil Units**

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Electronic Supplementary Information

a

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c

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d

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Figure S1. Amino acid sequences of the four egg capsule proteins. (a) ECP1a, (b) ECP1b, (c) ECP2, (d) ECP3.

a

ATGGATCTGGATTTTGTATGTGCCGACCGAAGCGGCCAAAAAAGGCCGCGGTTTTGGCGATTTCAAAACGAG
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b

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Figure S2. Optimized gene sequences of the four egg capsule proteins. (a) ECP1a, (b) ECP1b, (c) ECP2, (d) ECP3.

c

ATGCTGTTTTCAAGGCTTCAACTTCGGCAAAAAAGATGGCCCGTTCAACCTGCTGCATAAACACCTGGACAT
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Figure S2 (continued). Optimized gene sequences of the four egg capsule proteins. (a) ECP1a, (b) ECP1b, (c) ECP2, (d) ECP3.

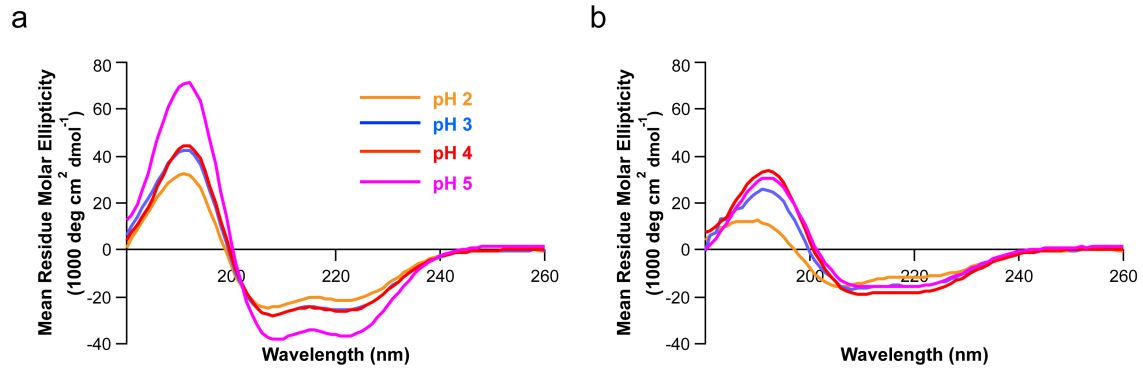


Figure S3. Circular Dichroism (CD) spectra of the egg capsule proteins at different pH. (a) ECP1a, (b) ECP2.

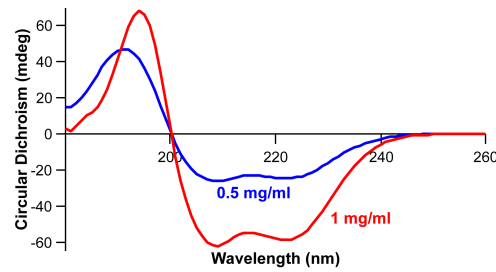


Figure S4. CD spectra of refolded ECP1b at pH 5 at different concentrations.

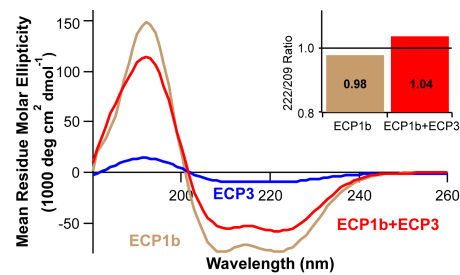


Figure S5. CD spectra of ECP1b and ECP3 at pH 5, with DTT.

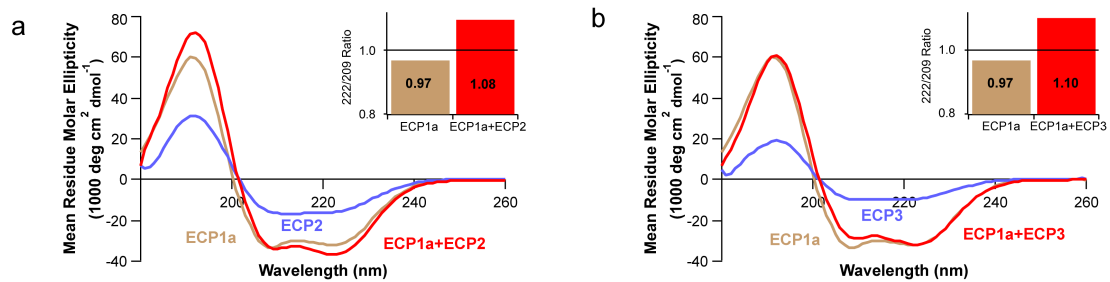


Figure S6. CD spectra of the egg capsule proteins in different pair combinations at pH 5. (a) ECP1a and ECP2, (b) ECP1a and ECP3.

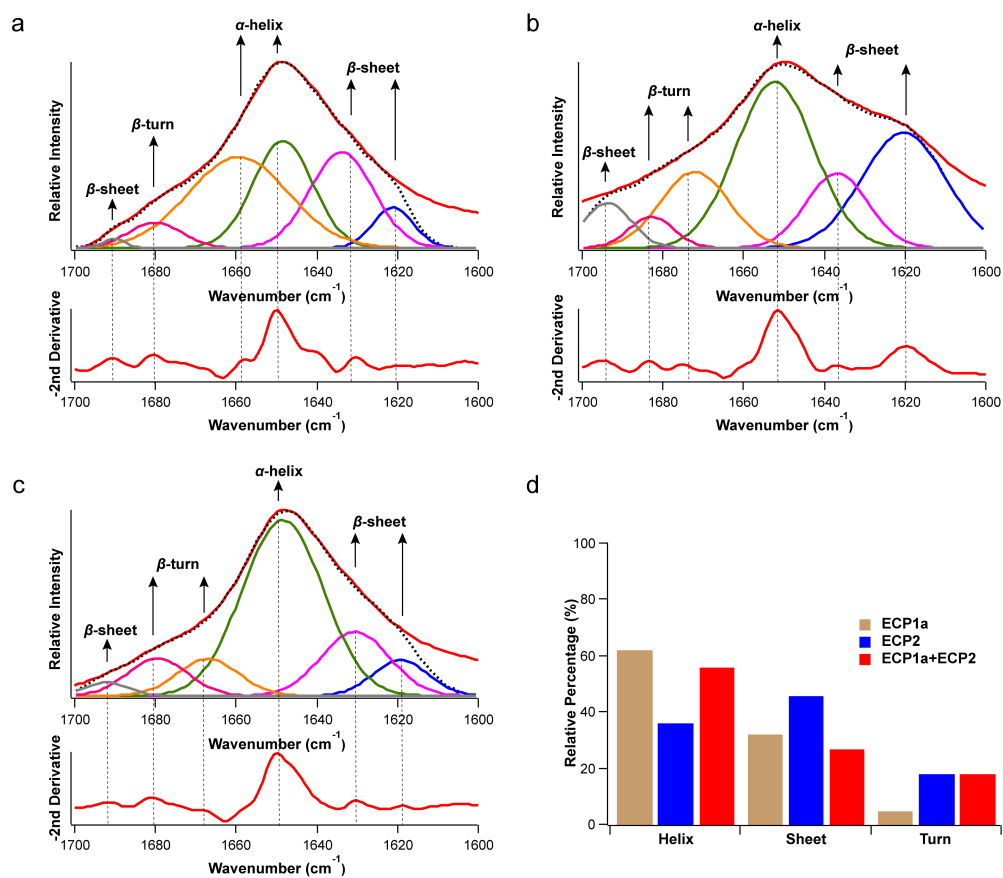


Figure S7. ATR-FTIR spectra of ECP1a and ECP2 refolded at pH 5 and their deconvolution. (a) ECP1a, **(b)** ECP2, **(c)** ECP1a+ECP2 in pair with a 1:1 ratio. **(d)** Relative fraction of the different secondary structures in the refolded proteins.

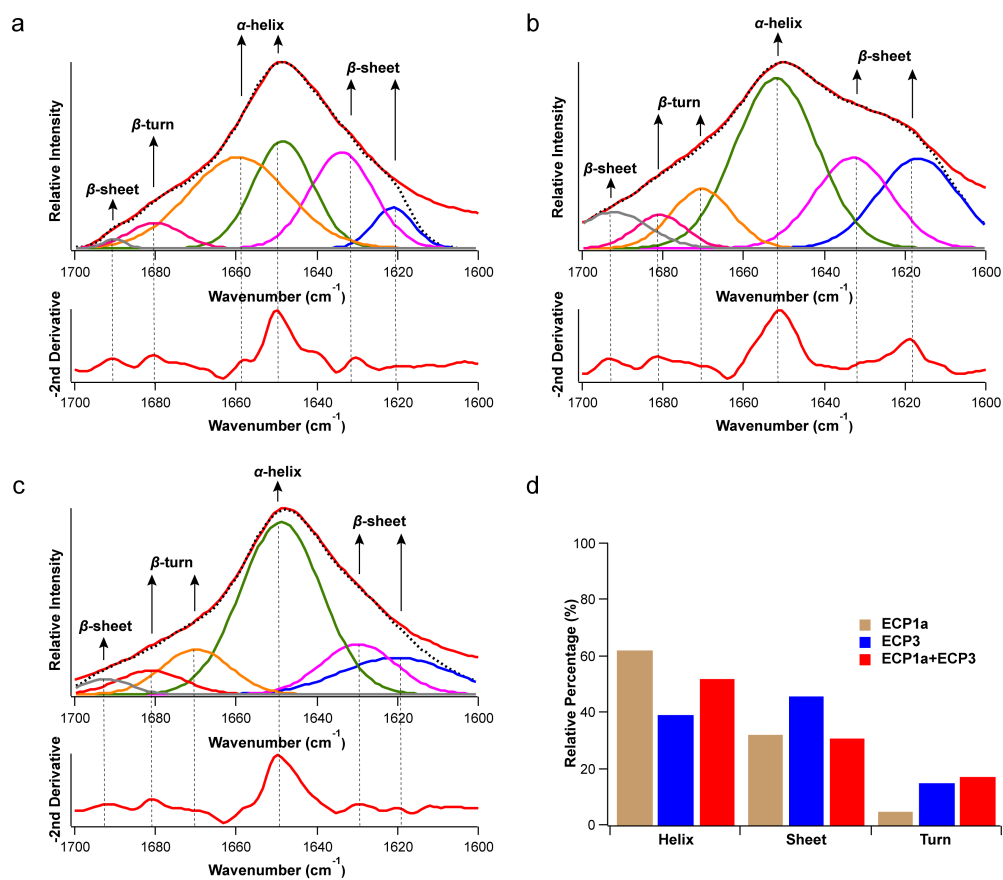


Figure S8. ATR-FTIR spectra of ECP1a and ECP3 refolded at pH 5 and their deconvolution. (a) ECP1a, **(b)** ECP3, **(c)** ECP1a+ECP3 in pair with a 1:1 ratio. **(d)** Relative fraction of the different secondary structures in the refolded proteins.

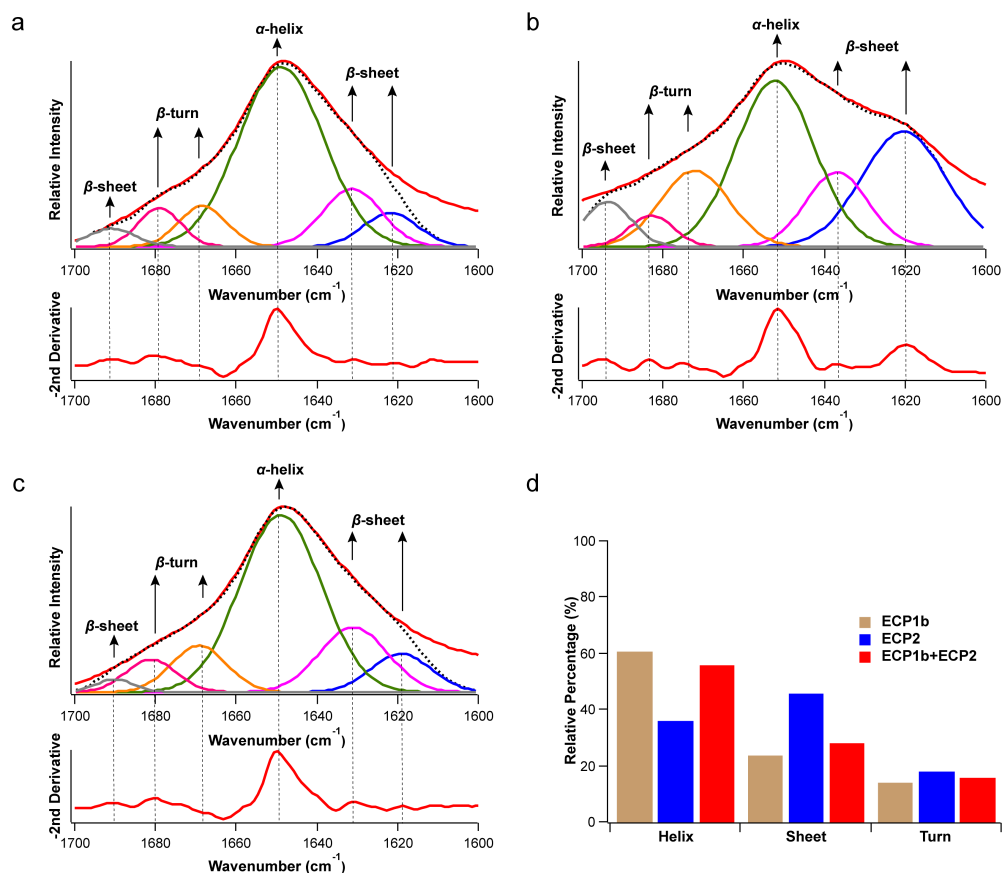


Figure S9. ATR-FTIR spectra of ECP1b and ECP2 refolded at pH 5 and their deconvolution. (a) ECP1b, **(b)** ECP2, **(c)** ECP1b+ECP2 in pair with a 1:1 ratio. **(d)** Relative fraction of the different secondary structures in the refolded proteins.

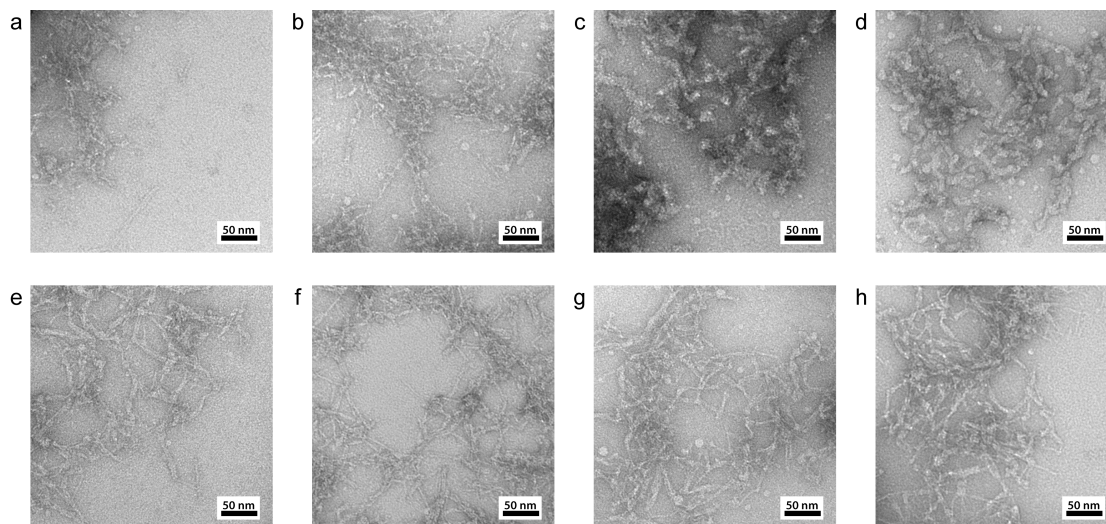


Figure S10. TEM images of the egg capsule proteins refolded at pH 5. (a) ECP1a, **(b)** ECP1b, **(c)** ECP2, **(d)** ECP3, **(e)** ECP1a+ECP2, **(f)** ECP1a+ECP3, **(g)** ECP1b+ECP2, **(h)** ECP1b+ECP3. Well defined filaments were only observed when ECP1a/ECP1b and ECP2/ECP3 were refolded in pairs.

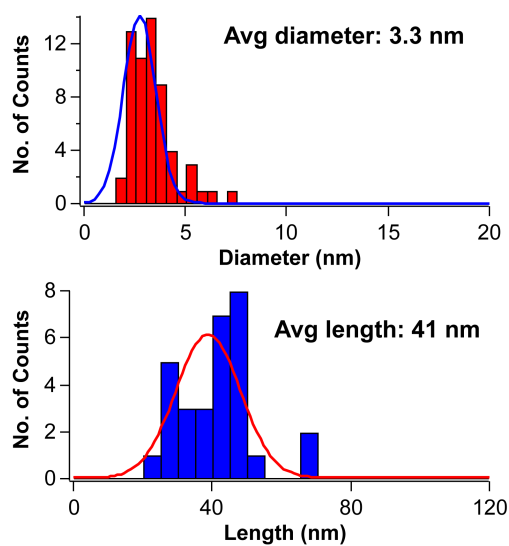


Figure S11. Diameter and length distributions of individually refolded ECP1b.

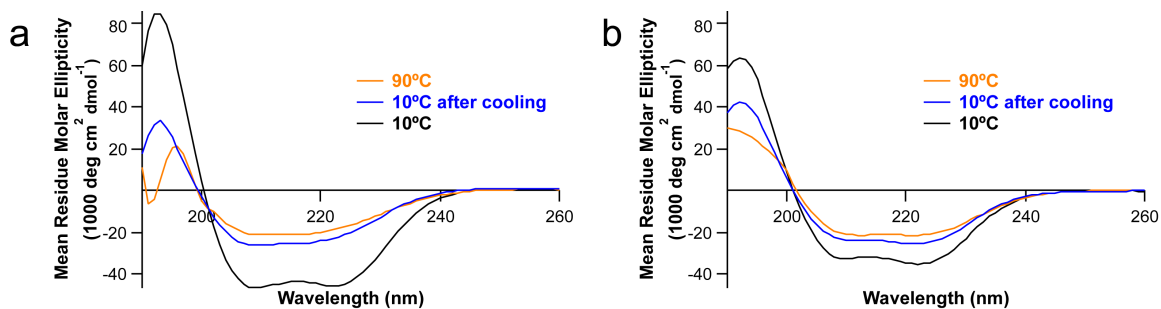


Figure S12. CD spectra of ECP1a and ECP1a+ECP2 before and after temperature ramping. (a) ECP1a; (b) ECP1a+ECP2. The α -helicity of the simple helices (individual ECP1a) was irreversibly lost after heat denaturation, whereas the coiled-coil features of ECP1a+ECP2 were maintained before and after heating.