

## Distinct binding modes of pesticides affect the phase transition of lysozyme

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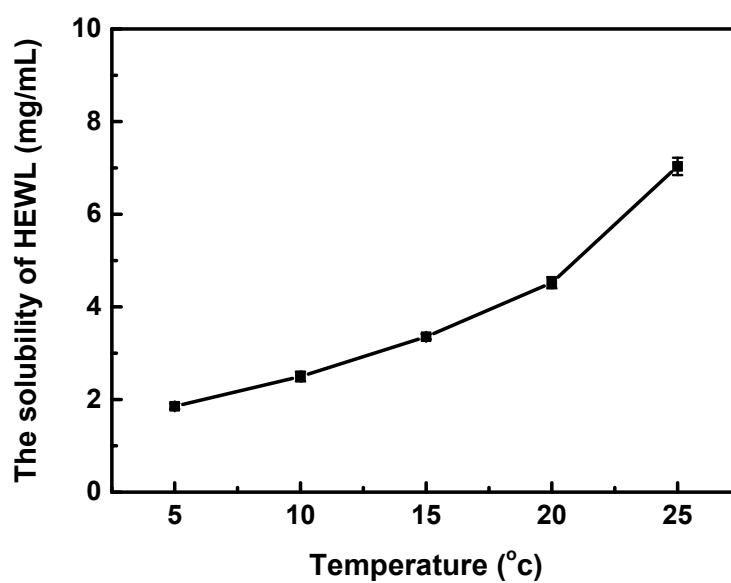
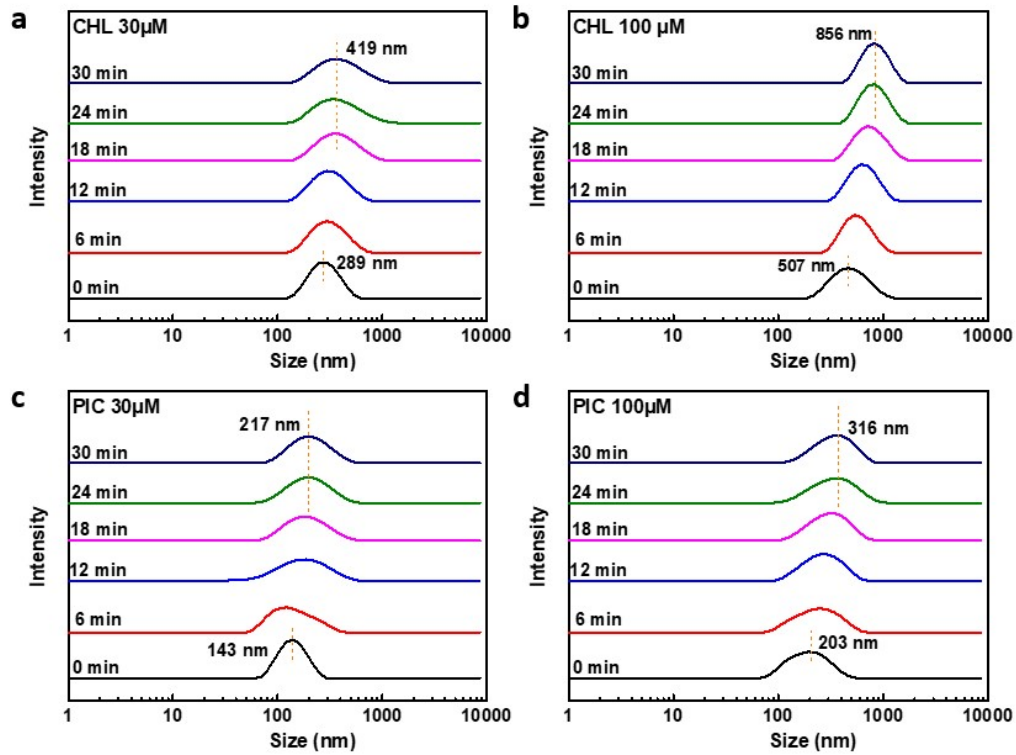
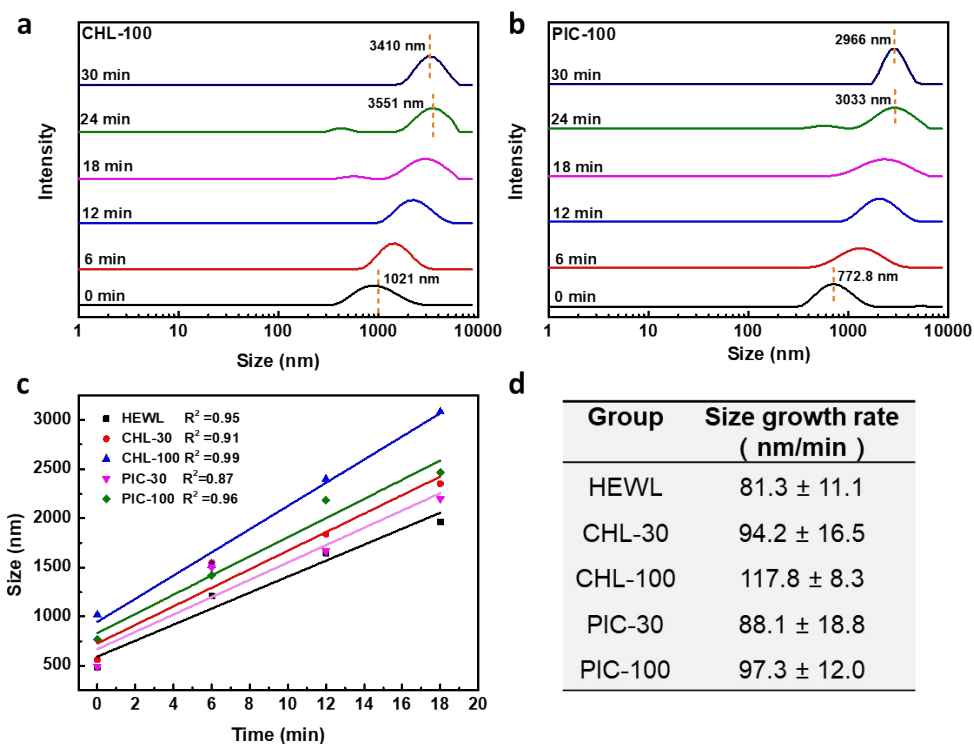


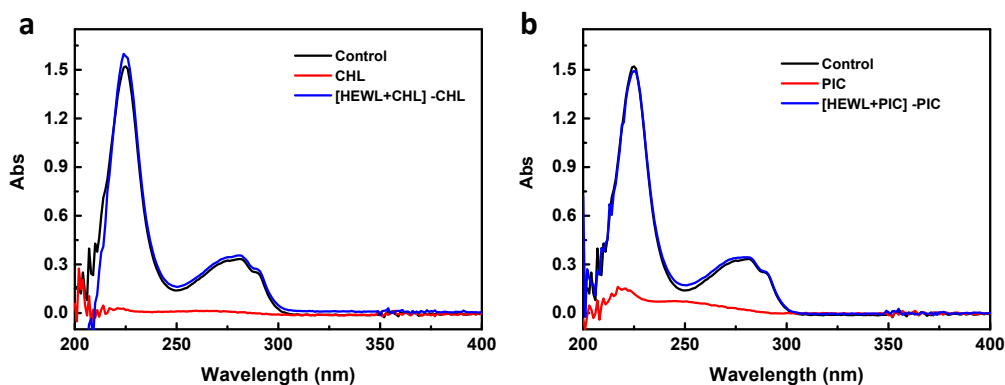
Fig. S1 The solubility of HEWL as a function of temperature (pH 4.6, 0.6 M NaCl).



**Fig. S2** Size distribution of aggregates in the crystallization solution (0.6 M NaCl, pH=4.6) containing the pesticide but without the protein HEWL at 10 °C, with the individual pesticide of (a)30  $\mu$ M CHL; (b) 100  $\mu$ M CHL; (c) 30  $\mu$ M PIC; (d) 100  $\mu$ M PIC.



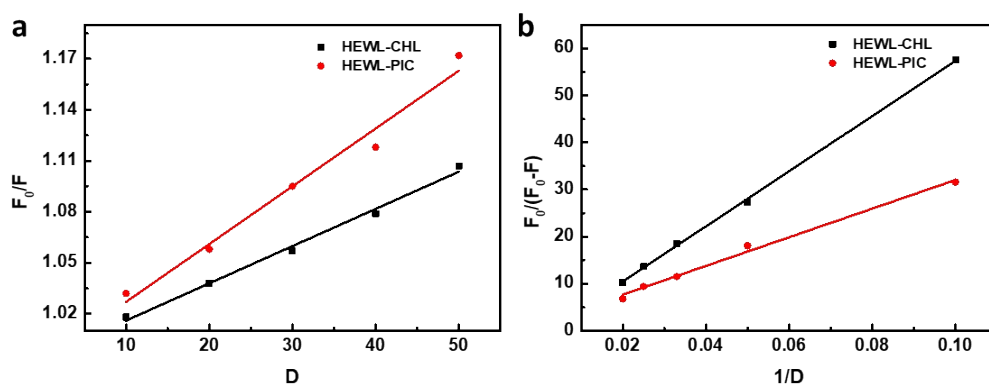
**Fig. S3** Size distributions of protein aggregates in the crystallization solution with high contents of pesticides at 10 °C, the initial concentration is 15mg/mL for HEWL, 100  $\mu$ M for either CHL or PIC, 0.6 M for NaCl and pH=4.6. (a) CHL-100; (b) PIC-100; (c) Curves of protein aggregates' size versus the crystallization time in the absence and presence of pesticides, based on DLS measurements within 18 min; (d) The growth rates of HEWL aggregates' size estimated according to the linear fitting of curves in (c).



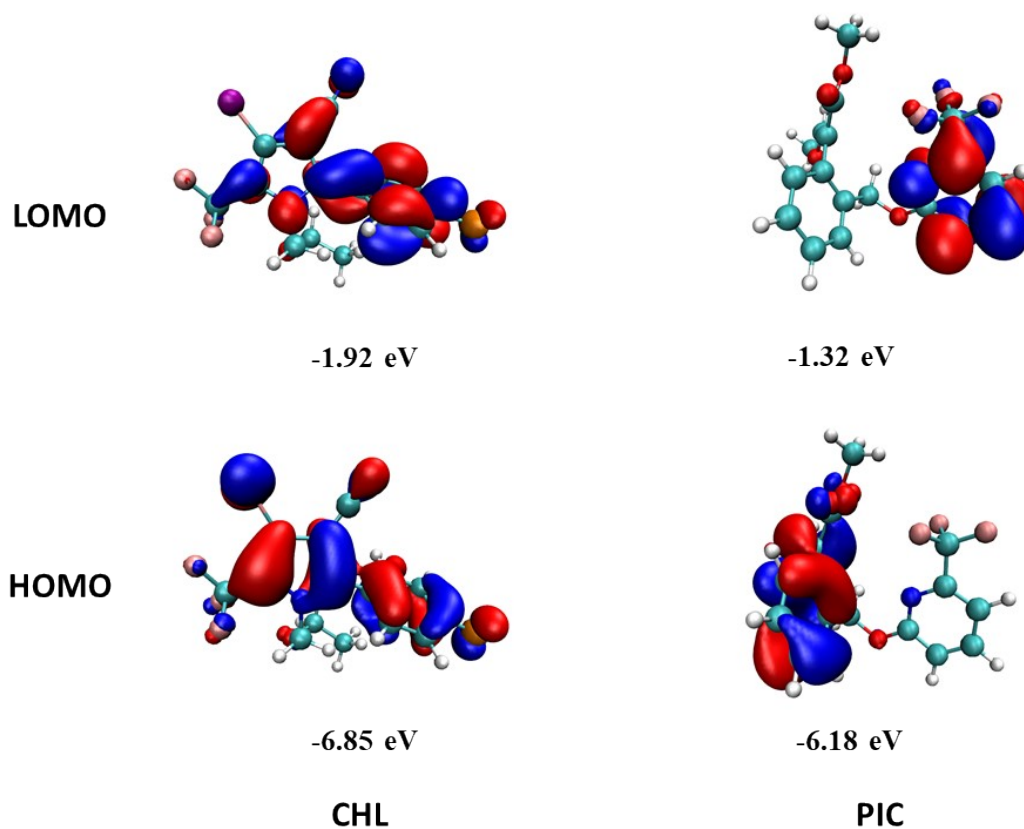
**Fig.S4** Absorption spectra of the buffer solutions containing only pesticide additive of CHL(a) and PIC(b), only HEWL(Control), as well as containing both pesticide and HEWL ([HEWL + pesticides] – [pesticides]). The concentrations of HEWL, CHL and PIC are set as  $1.0 \times 10^{-5}$  mol/L in the solutions.

**Table S1.** Stern-Volmer and Lineweaver-Burk quenching constants for the systems of HEWL-CHL and HEWL-PIC.

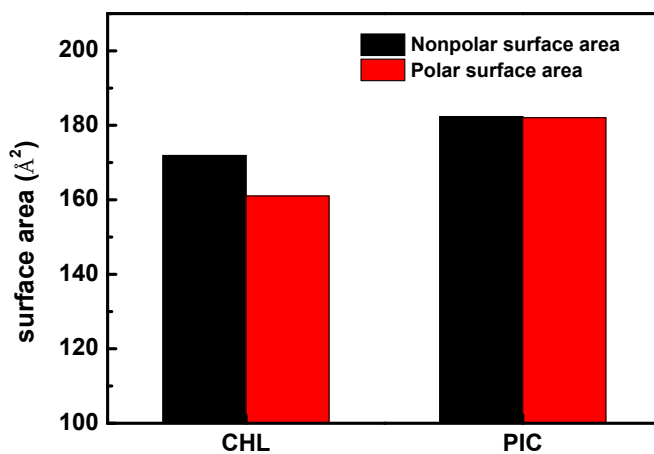
Group	$K_{SV}$ ( $10^4$ L/mol)	$K_{LB}$ ( $10^6$ L/mol)	$R^2$
HEWL-CHL	2.19	2.75	0.99
HEWL-PIC	3.4	5.29	0.98



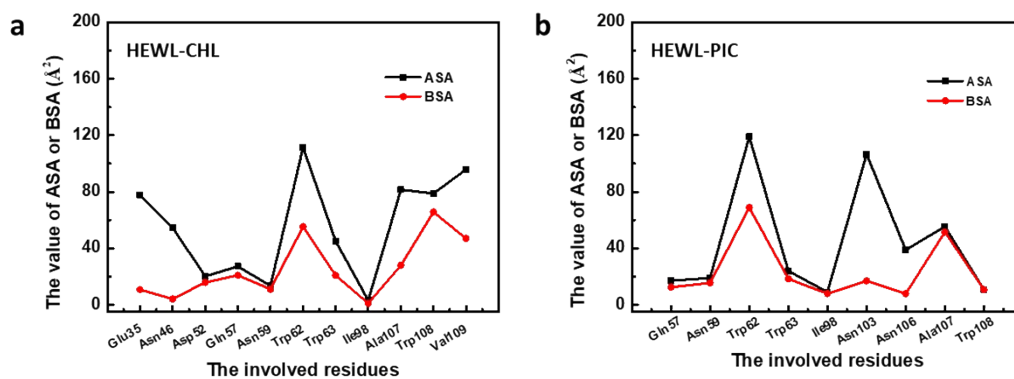
**Fig. S5** Stern-Volmer (a) and Line weaver-Burk (b) curves of HEWL-CHL/PIC system at 23 °C, pH= 4.6.



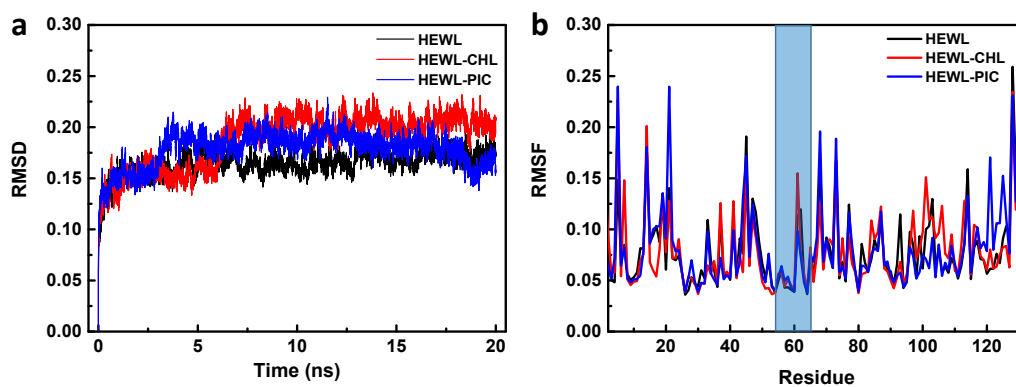
**Fig. S6** Frontier Molecular Orbital of ground state on HOMO and Frontier Molecular Orbital of ground state on LUMO of CHL and PIC, respectively.



**Fig.S7** The nonpolar and polar surface area of CHL/PIC



**Fig. S8** The accessible surface areas (ASA) and the buried surface areas (BSA) for the involved amino acid residues. (a) HEWL-CHL; (b) HEWL-PIC.



**Fig. S9** RMSD and RMSF plots of protein for HEWL and HEWL-CHL/PIC systems. (a) Plot of RMSD as a function of simulation time extended for 20 ns; (b) RMSF values of HEWL and HEWL-CHL/PIC as a function of residue number. The shaded area in (b) represents the binding area of pesticides and protein.