

**Figure S1. A**, FE-SEM analysis of (**a**) N-Ag-PVP, (**b**) HP and (**c**) N-Ag-PVP+HP. \* Red wedge is N-Ag-PVP; **B**, XRD patterns of (**a**) N-Ag-PVP and (**b**) N-Ag-PVP+HP; **C**, High resolution-raman analysis of N-Ag-PVP, N-Ag-PVP+HP and HP.



**Figure S2.** Condition of embryos (1.5 hpf) and media immediately after exposure about (**a**) Control, (**b**) N-Ag-PVP, (**c**) HP, (**d**) N-Ag-PVP+HP, (**e**) Hym176 and (**f**) N-Ag-PVP+Hym176 (c, chorion).



**Figure S3.** The effects of the N-Ag-PVP with Hydra materials (HP, Hym 176) and pure N-Ag-PVP on the development of zebrafish. Embryos were exposed to (a) Control, (b) N-Ag-PVP(1 mg/L), (c) HP(4 mg/L), (d) N-Ag-PVP+HP(1 or 4 mg/L), (e) Hym176(4 mg/L) and (f) N-Ag-PVP+Hym176(1 or 4 mg/L). These images show exposed zebrafish at 72 hpf. Abbreviations: i, inflammation; t, tail; n, notochord; e, edema; k, kidney; y, yolk sac.



**Figure S4.** Hierarchical clustering analyzed by z-score of differentially expressed genes in zebrafish larva exposed to each experimental group (Fold change:  $\geq 2$ ,  $\leq 0.5$ ; Normalized RC (log2):  $\geq 5$ ). The z-score is based on the mean of each expressed gene.