Supporting Information

For

Organotin Release from Polyvinyl Chloride Microplastics and Concurrent Photodegradation in Water: Impacts from Salinity, Dissolved Organic Matter, and Light Exposure

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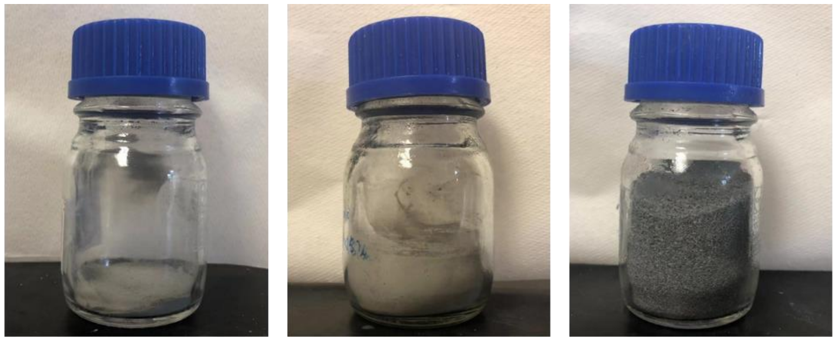
Eight Figures: Figure S1-Figure S8

One Tables: Table S1



Small PVC particles Medium PVC particles Large PVC particles

Fig. S1. Pictures for three different sized PVC microplastics used in the experiments.

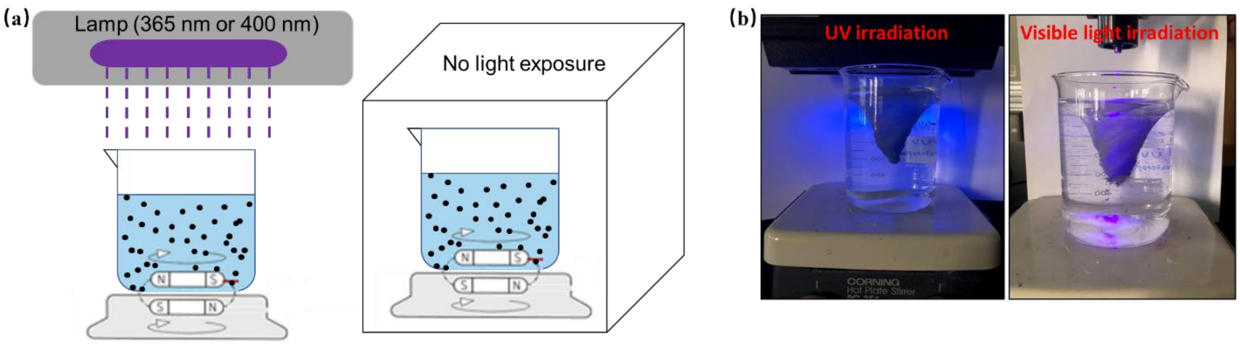


Fig. S2. Experimental setup for OTC release from PVC microplastics in artificial seawater magnetic stirred under UV or visible light irradiation, as well as under darkness. (a) Schematics and (b) Experimental setup.

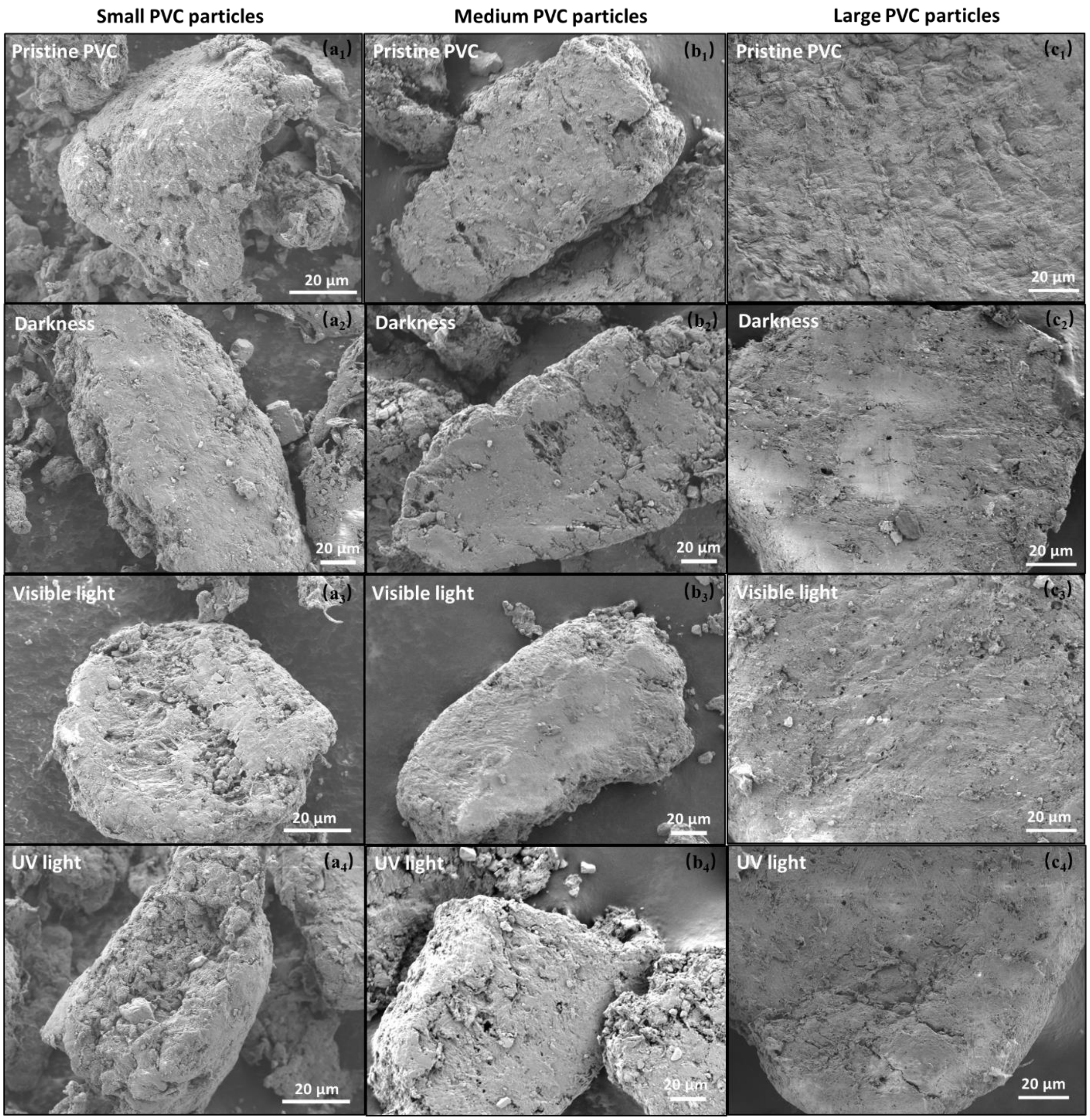


Fig. S3. SEM micrograph of three sized PVC microplastics before and after being magnetic stirred in artificial seawater for 56 h. (a) Pristine PVC microplastics; (b) Dark-treated PVC microplastics; (c) Visible light-irradiated PVC microplastics and (d) UV-irradiated PVC microplastics.

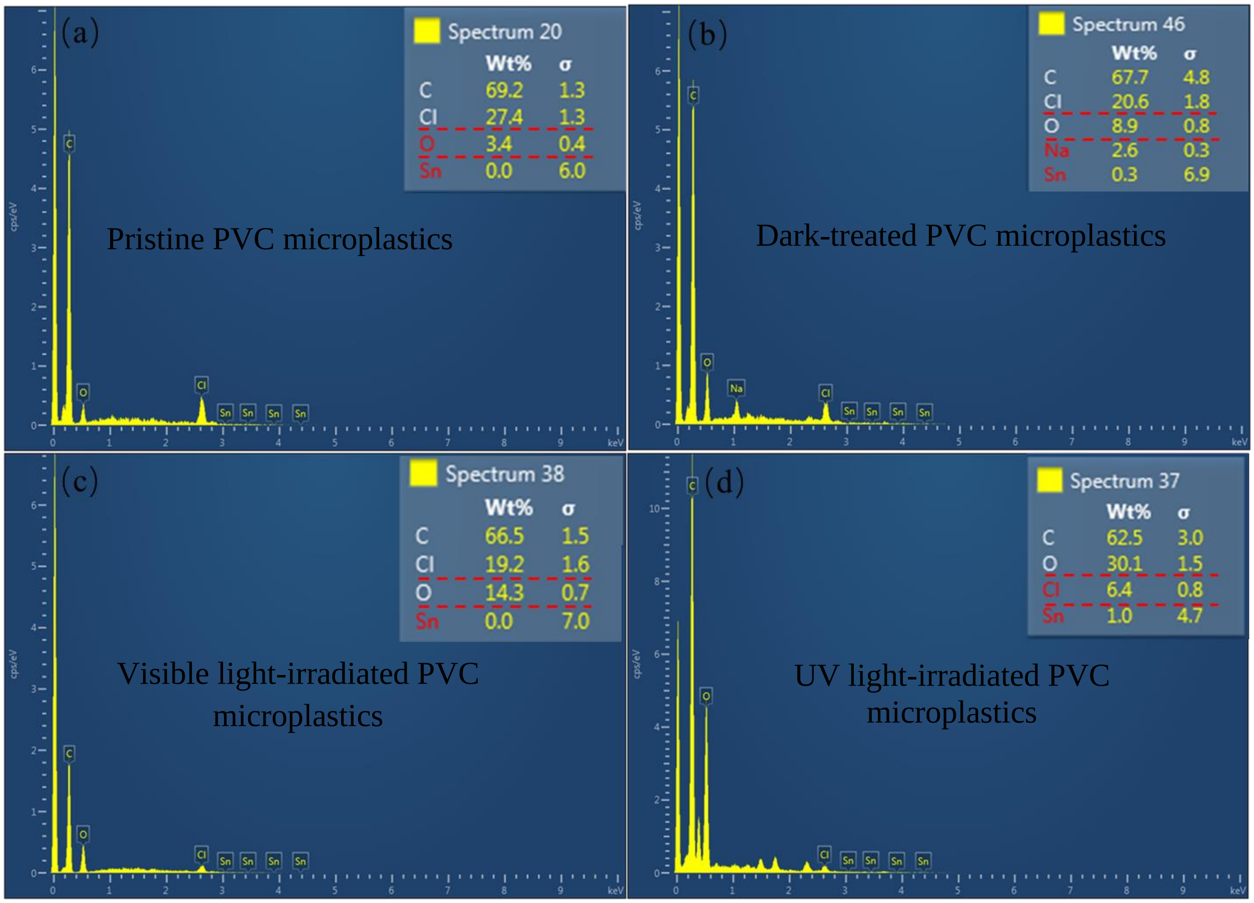


Fig. S4. EDS surface mapping for small PVC microplastics before and after being magnetic stirred in artificial seawater for 56 h. (a) Pristine PVC microplastics; (b) Dark-treated PVC microplastics; (c) Visible light-irradiated PVC microplastics and (d) UV-irradiated PVC microplastics.

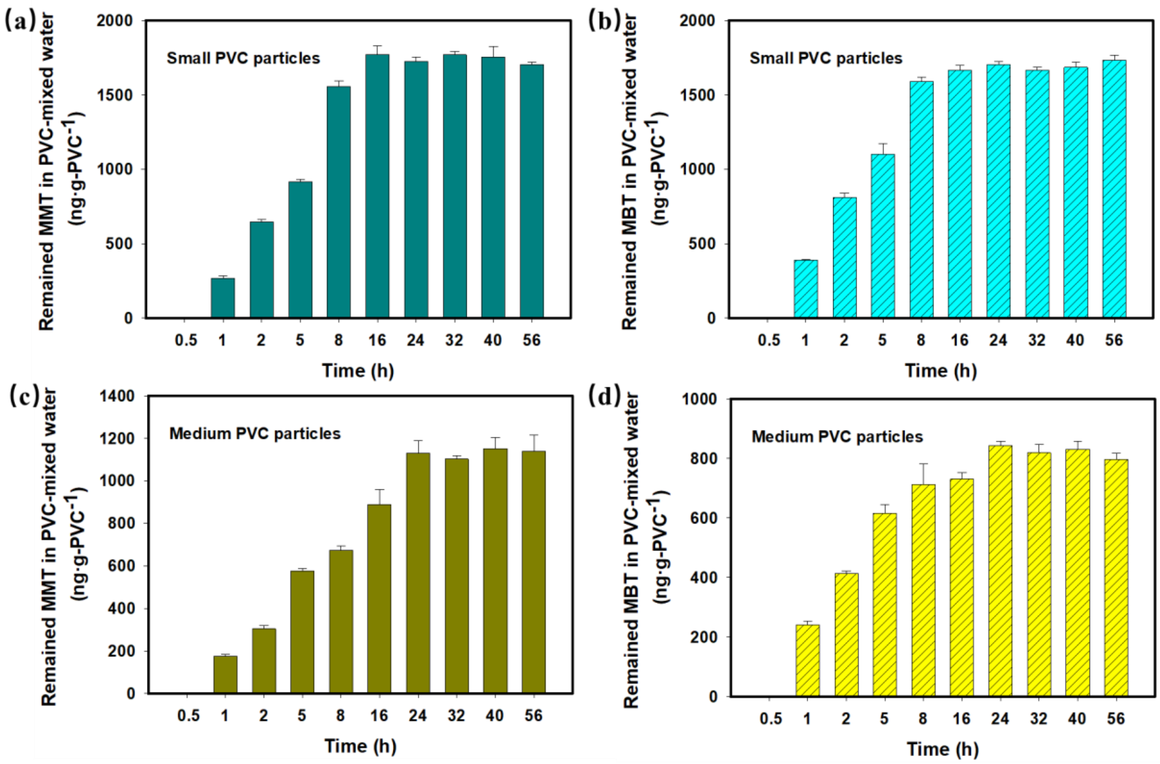


Fig. S5. Temporal variation of mono-substituted OTCs remaining in the aqueous phase of PVC suspension under darkness: (a, b) Small PVC microplastics and (c, d) Medium PVC microplastics. No MMT or MBT was found to release from large PVC microplastics.

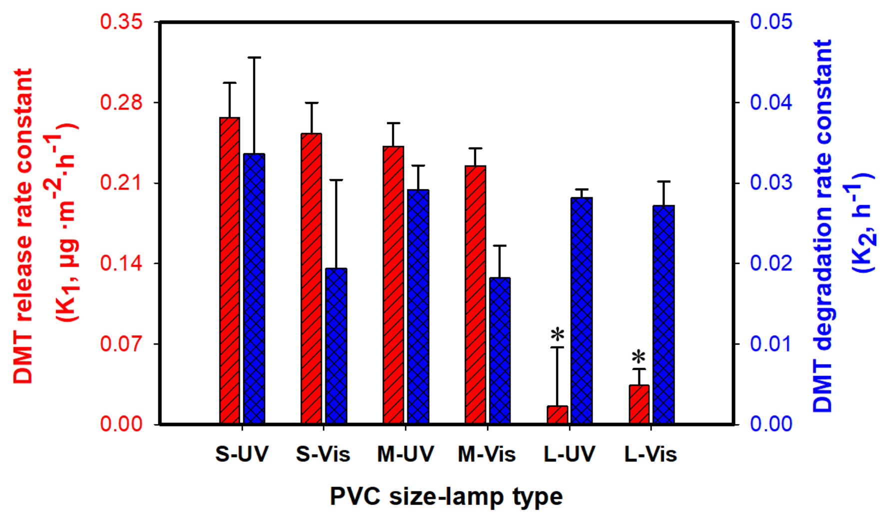


Fig. S6. Release rate constant (K_1, μg·m^{-2}·h^{-1}) and degradation rate constant (K_2, h^{-1}) of DMT in aqueous phase of the PVC suspension under UV or visible light irradiation via the best model fitting. * The K_1 values obtained from large PVC microplastics were significantly lower than those from small and medium PVC particles.

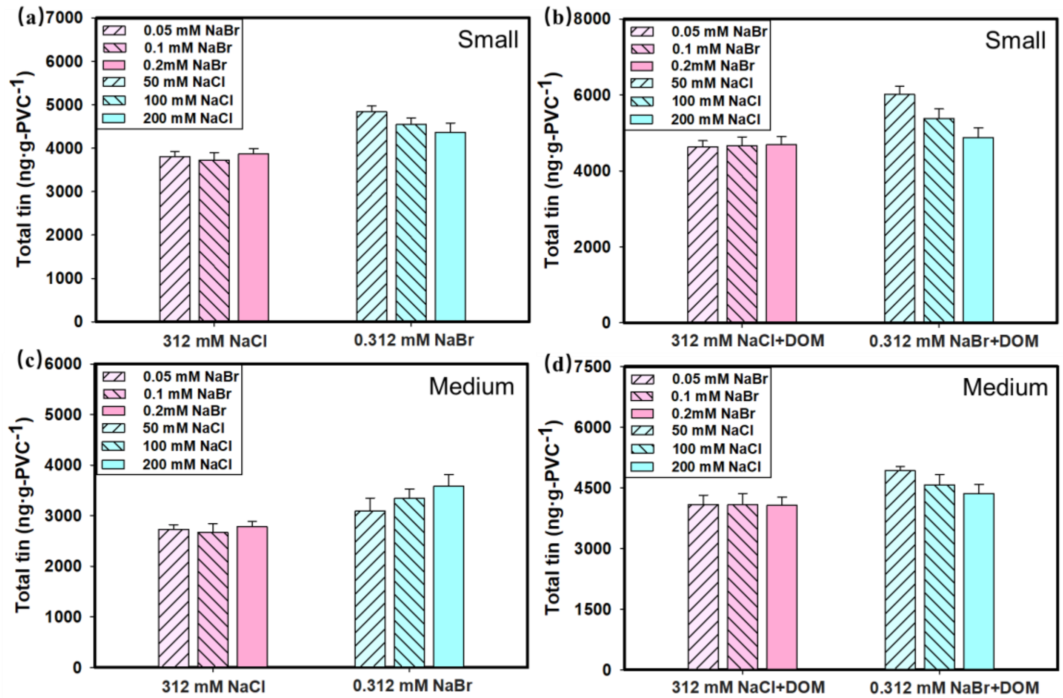


Fig. S7. Total tin concentrations in the aqueous phase of PVC suspension under various halide ions (Cl^- or Br^-) conditions and with/without humic acid. During the experiments they were irradiated by UV light for 24 h. (a, b) Small PVC microplastics and (c, d) Medium PVC microplastics.

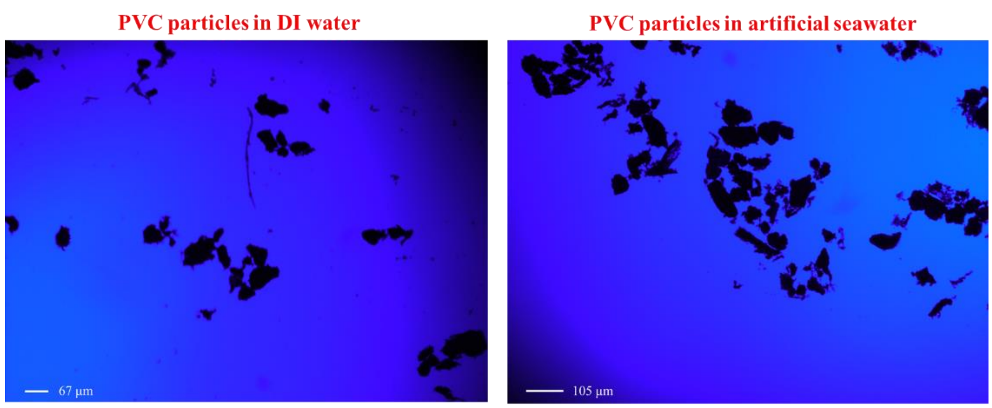


Fig. S8. PVC microplastics of the same concentration in DI water (left) and artificial seawater (right).

Table S1. Zeta potentials for PVC microplastics in DI water after immersion in artificial seawater for 56 h with/without UV or visible light irradiation.

Particle size	Zeta potential (mV)			
	Pristine PVC	UV light (365 nm)	Visible light (400 nm)	Darkness
Small	-28.5±0.44	-36.1±3.78*	-40.2±0.58*	-40.8±0.53*
Medium	-27.0±0.59	-35.4±4.36*	-34.4±1.71*	-37.5±2.06*
Large	-23.3±0.88	-25.7±0.86	-27.2±1.42*	-28.0±2.62*

* Significant differences between the pristine and treated PVC microplastics with same sizes (p<0.05).

$$PO_2H \xrightarrow{hv} PO^{\bullet} + {}^{\bullet}OH$$ **(Eq. S1)**

$${}^{\bullet}OH + P-H \xrightarrow{hv} P^{\bullet} + H_2O$$ **(Eq. S2)**

$$\bullet OH + Cl^{-} \rightarrow OH^{-} + Cl^{\bullet}$$ **(Eq. S3)**

$$\bullet OH + Br^{-} \rightarrow OH^{-} + Br^{\bullet}$$ **(Eq. S4)**

$$Cl^{\bullet} + Cl^{-} \rightarrow Cl_2^{\bullet -}$$ **(Eq. S5)**

$$Br^{\bullet} + Br^{-} \rightarrow Br_2^{\bullet -}$$ **(Eq. S6)**

$$Br_2^{\bullet -} + Cl^{-} \rightarrow ClBr^{\bullet -} + Br^{-}$$ **(Eq. S7)**

$$Cl_2^{\bullet -} + Br^{-} \rightarrow ClBr^{\bullet -} + Cl^{-}$$ **(Eq. S8)**

$$Br^{\bullet} + Cl^{-} \rightarrow ClBr^{\bullet -}$$ **(Eq. S9)**

$$DOM + hv \rightarrow {}^{1}DOM^{*}$$ (**Eq. S10)**

$${}^{1}DOM^{*} + hv \rightarrow {}^{3}DOM^{*}$$ **(Eq. S11)**

$${}^{3}DOM^{*} + Cl^{-} \rightarrow {}^{1}DOM^{*} + Cl^{\bullet}$$ **(Eq. S12)**

$${}^{3}DOM^{*} + Br^{-} \rightarrow {}^{1}DOM^{*} + Br^{\bullet}$$ **(Eq. S13)**