Supplementary data

Enhanced removal of fluoride by zirconium modified tea waste with extrusion treatment: kinetics and mechanism

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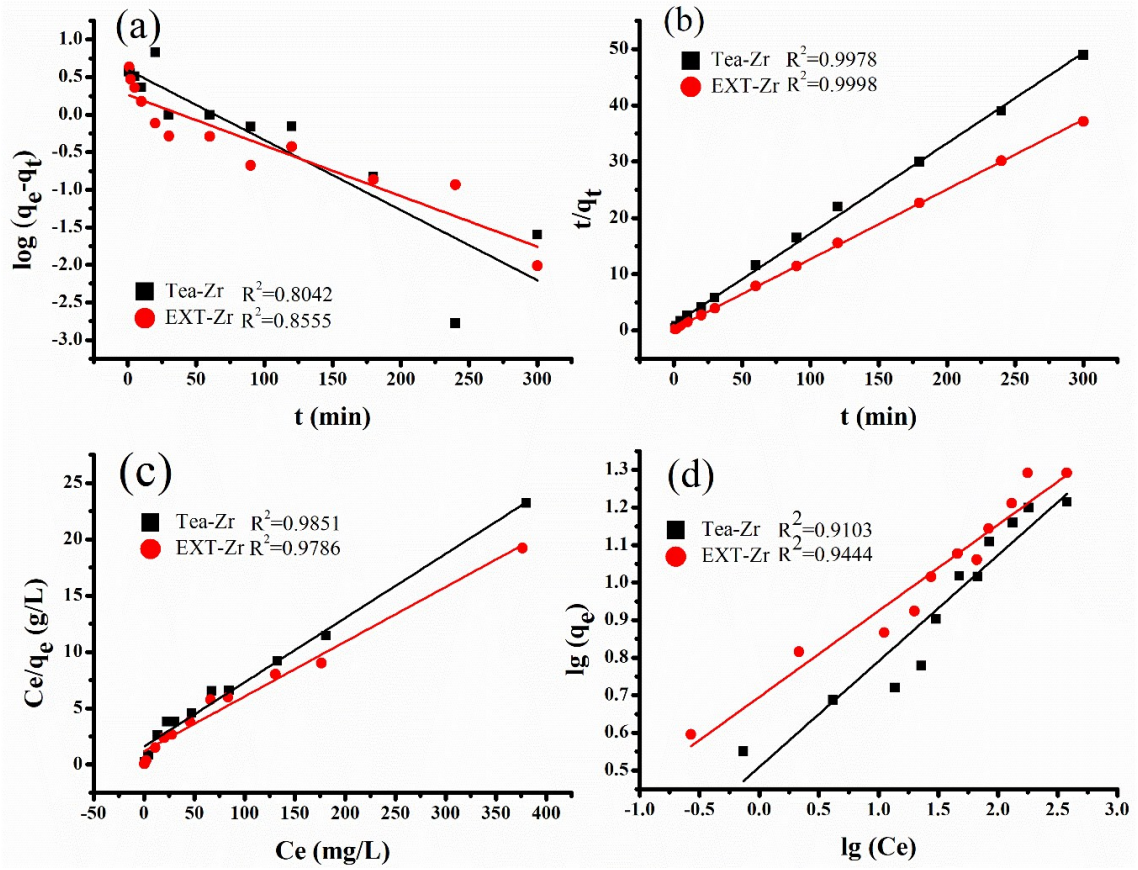

Fig. S1. The pseudo-first order kinetic model (a), pseudo-second order kinetic model (b), Langmuir isotherm (c) the Freundlich isotherm (d) for fluoride adsorption by tea waste with zirconium (Tea-Zr) and extruded with zirconium (EXT-Zr).

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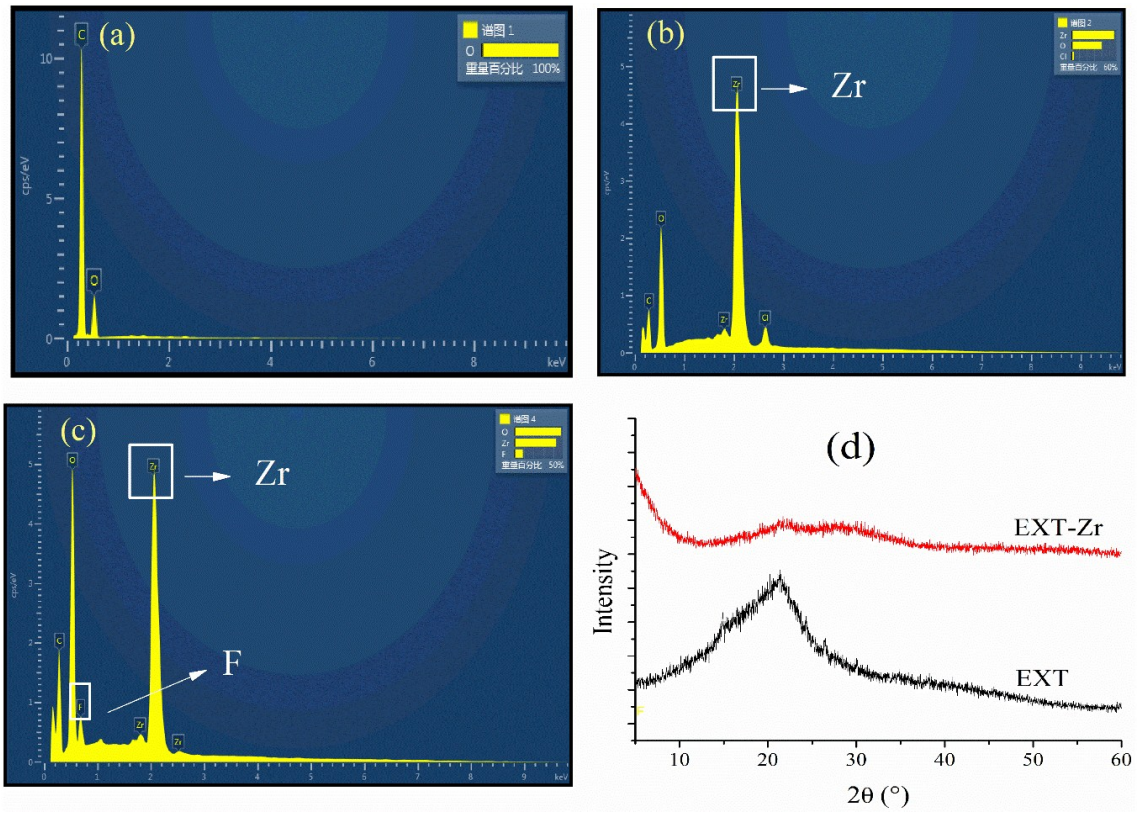

Fig S2. EDS spectra of the EXT (a), EXT-Zr (b) and EXT-Zr-F (c) and X-ray diffractometry (XRD) of EXT (black, below) and EXT-Zr (red, above) (d).

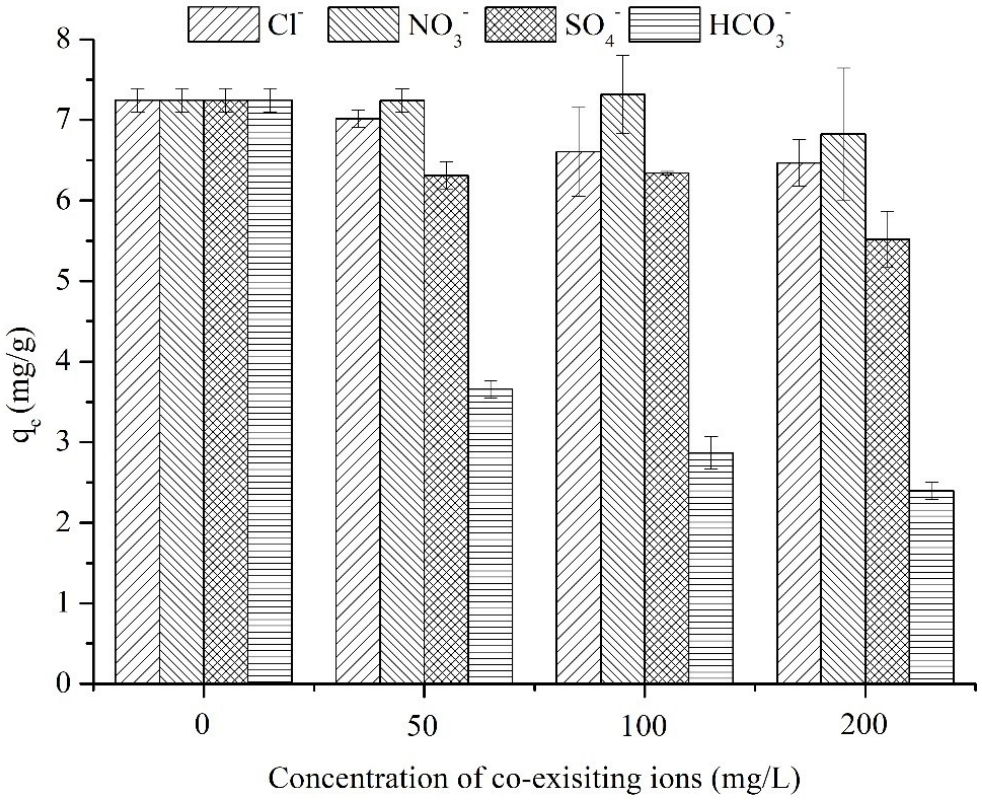

Fig. S3. The effects of co-existing ions in the aqueous solution on the fluoride adsorption capacity (qe) of the EXT-Zr.

Table S1. Elemental concentrations on the surfaces of EXT, EXT-Zr and EXT-Zr-F obtained from XPS analysis.

Samples	Atomic ratio %				
	C	O	Zr	F	Total
EXT	78.01	21.99	0	0	100
EXT -Zr	62.43	31.55	6.02	0	100
EXT -Zr-F	59.6	32.6	5.8	2	100