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Supplementary Information

Synthesis of borophene on quartz toward hydroelectric generator†

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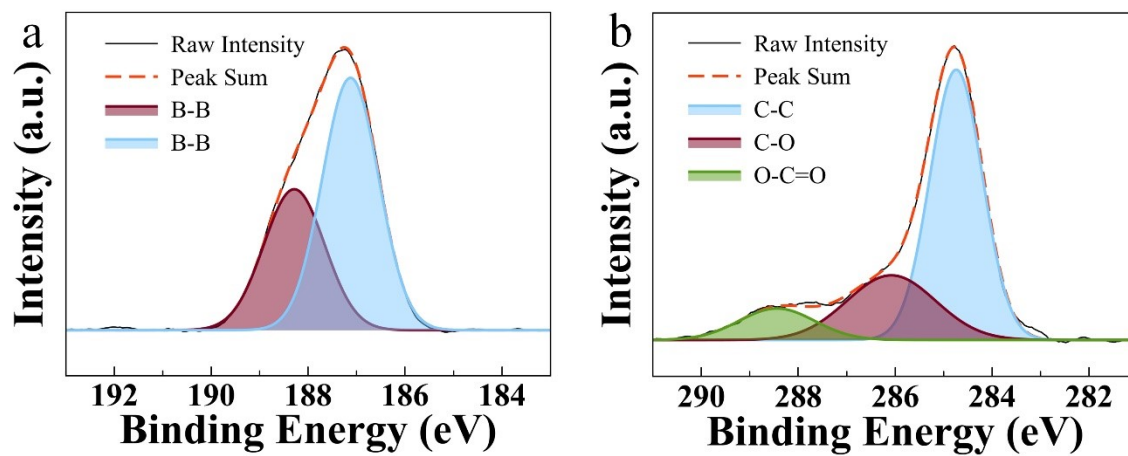


Figure S1. XPS spectra of the borophene film transferred on SiO₂/Si substrates. (a) High-resolution XPS spectra of B_{1s}. (b) High-resolution XPS spectra of C_{1s}.

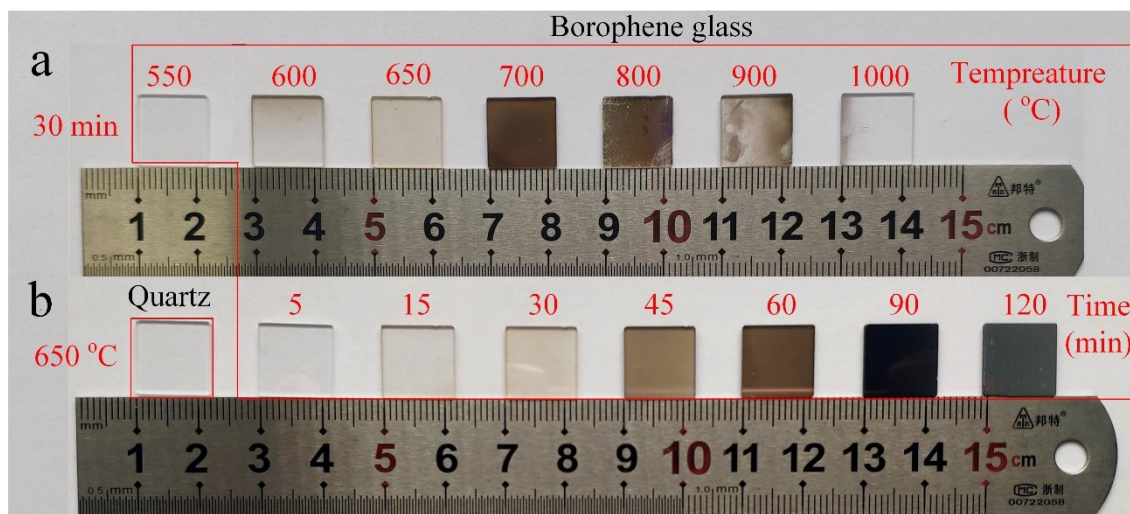


Figure S2. Optical images of the borophene films on quartz substrates prepared at different temperatures and durations. (a) Reaction temperatures varied from 550 to 1000 °C for 30 min. (b) Reaction durations varied from 5 to 120 min at 650 °C.

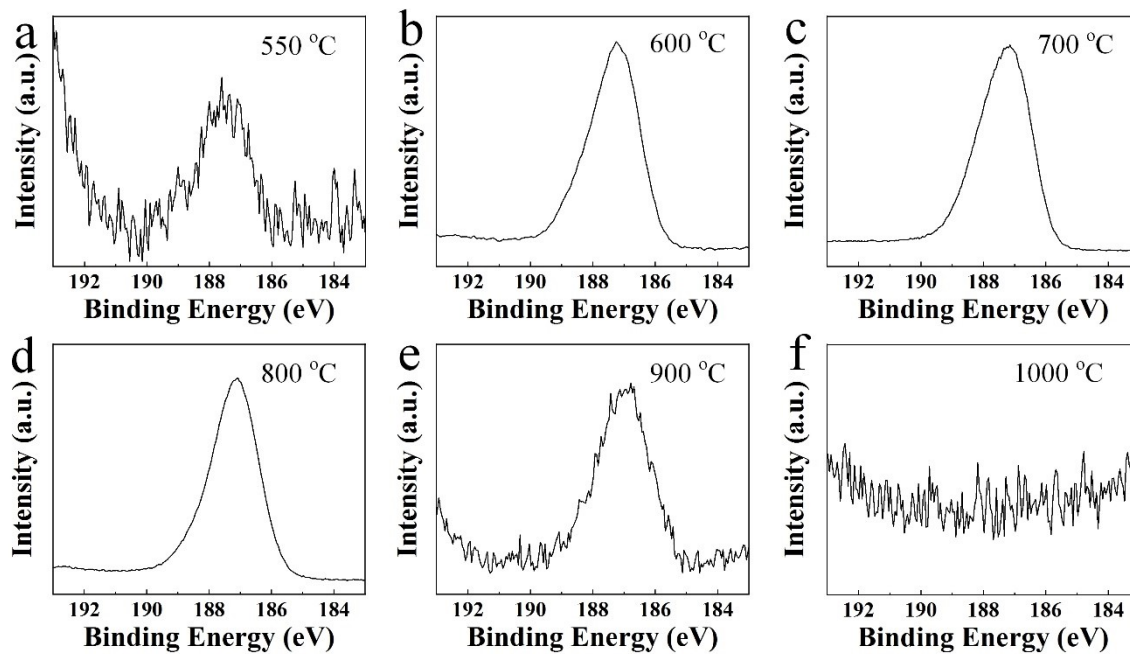


Figure S3. High-resolution XPS spectra of B_{1s} of the borophene films prepared at different temperatures for 30 min: (a) 550, (b) 600, (c) 700, (d) 800, (e) 900 and (f) 1000 °C.

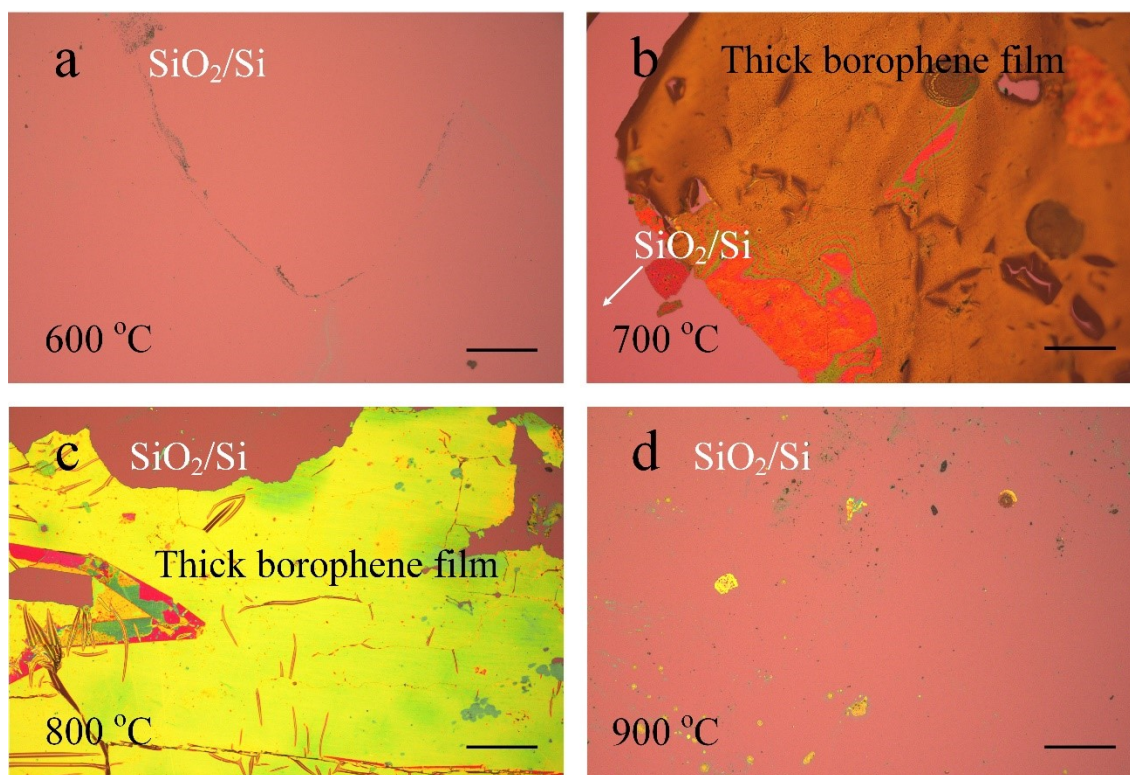


Figure S4. Optical images of the borophene samples transferred on SiO₂/Si substrates. (a-d) Samples prepared at (a) 600, (b) 700, (c) 800, and (d) 900 °C. The reaction duration is kept for 30 min and the scale bar is 50 μm.

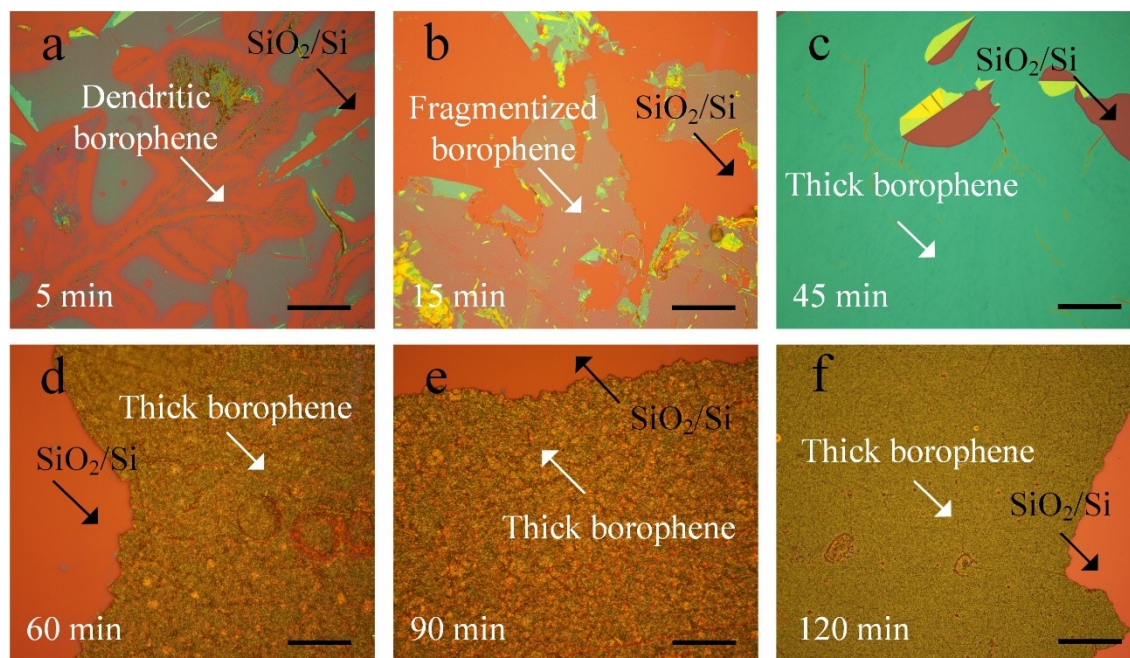


Figure S5. Optical images of the borophene films prepared at 650 °C for different durations: (a) 5, (b) 15, (c) 45, (d) 60, (e) 90 and (f) 120 min. The scale bar is 50 μm .

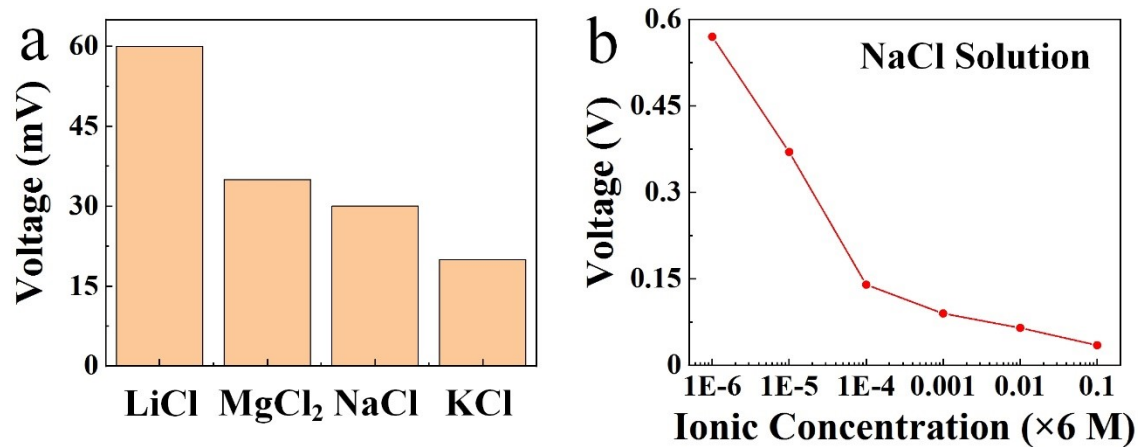


Figure S6. Dependence of induced voltage of the BHEG on the salt solutions. (a) Different ionic strength under the same concentration of 0.6 M. (b) Different concentrations. The flow velocity is 5 mL/s and the incident angle is 60°.

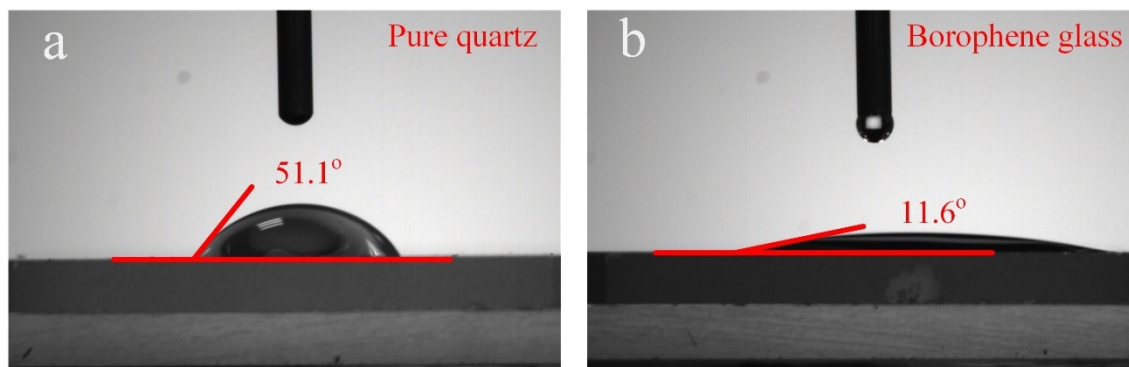


Figure S7. Contact angle images of the samples. (a, b) Original and borophene-covered quartz substrates.

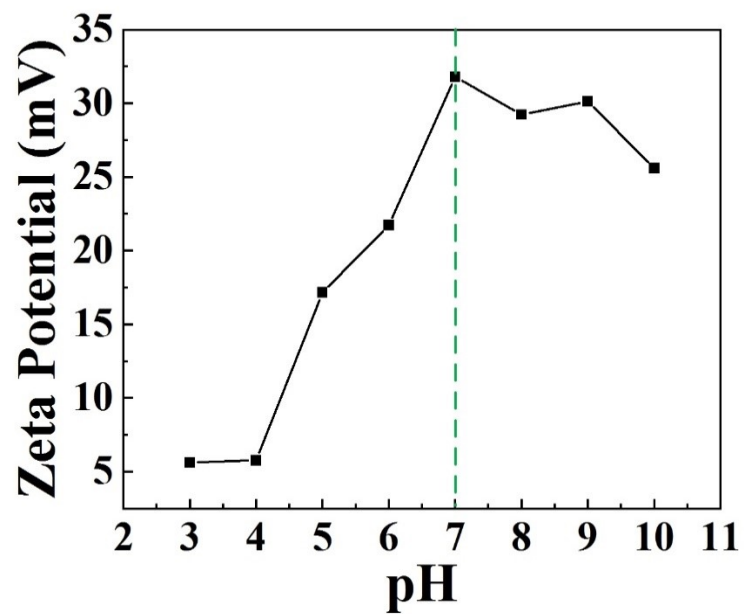


Figure S8. Zeta potential of borophene glass at different pH values.

Table S1. Comparison of elemental content of the borophene film on quartz and the film transferred on SiO₂/Si substrate.

Element	Borophene on quartz (At%)	Borophene on SiO ₂ /Si (At%)
B	74.93	59.67
C	11.91	14.27
O	8.23	18.83
Na	4.46	0.76
Si	0.11	5.22

Table S2. Comparison of performance of the BHEG device with previously reported carbon-based HEG

Materials	Method	Substrate	Liquid	Potential [mV]	Current [nA]	Ref.
Wrinkled graphene	CVD	SiO ₂ /Si	NaCl	37.6	78.4	[23]
			UPW	0	0	
Graphene	CVD	Glass	DI Water	80	--	[24]
Graphene grids	CVD	PDMS	NaCl	0.124	--	[25]
Graphene hydrogel membrane	Vacuum filtration	--	NaCl	-	2.23	[26]
SWCNT	Electric-arc	--	HCl	5.3	--	[27]
			Water	2.2	--	
Aligned MWCNT sheet	--	Polymer fiber	NaCl	151	--	[28]
MWCNT	CVD	Quartz	NaCl	30	--	[29]
SWCNTs	Vacuum filtration	Glass	KCl	0.037	--	[30]
			DI Water	0.007	--	
α' -2H-borophene	CVD	Quartz	NaCl	30	--	This work
			UPW	4000	14	

Notes: --: not mentioned; UPW: ultrapure water; Ref: references.