

# Boron-doped Diamond Interdigital Sensor with Alternating Excitation Strategy for Integrated Conductivity and Free Chlorine Measurement

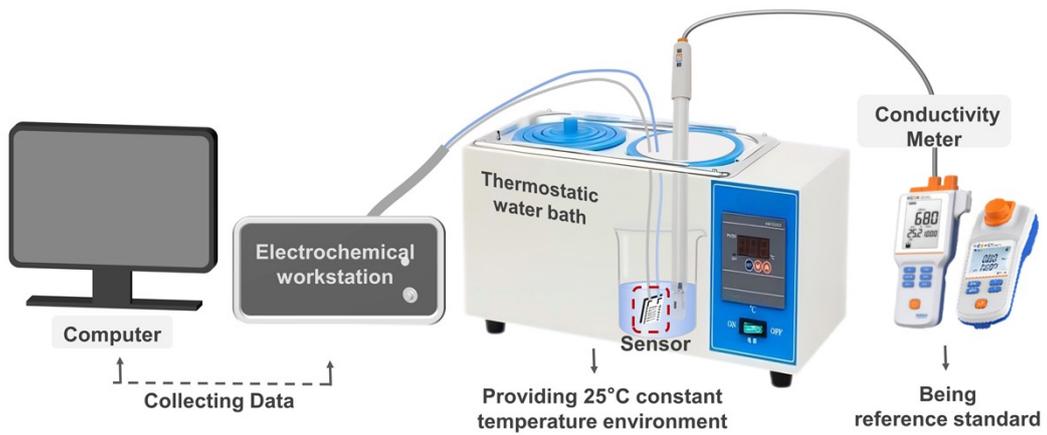
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Chemical Formula	Specification/Model	Manufacturer	Purpose
KCl	AR	Aladdin Reagent (Shanghai) Co., Ltd.	Adjust conductivity
H <sub>2</sub> SO <sub>4</sub>	AR	Shanghai Macklin Biochemical Technology Co., Ltd.	Activate the sensor
NaCl	AR	Aladdin Reagent (Shanghai) Co., Ltd.	Adjust conductivity
NaClO	AR	Shanghai Macklin Biochemical Technology Co., Ltd.	Prepare free chlorine solution
KH <sub>2</sub> PO <sub>4</sub>	AR	Aladdin Reagent (Shanghai) Co., Ltd.	Prepare neutral solution
Na <sub>2</sub> HPO <sub>4</sub>	AR	Aladdin Reagent (Shanghai) Co., Ltd.	Prepare neutral solution
Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub>	AR	Aladdin Reagent (Shanghai) Co., Ltd.	Prepare alkaline solution
HCl	AR	Shanghai Macklin Biochemical Technology Co., Ltd.	
NaOH	AR	Shanghai Macklin Biochemical Technology Co., Ltd.	Fine-tune pH
H <sub>3</sub> BO <sub>3</sub>	AR	Shanghai Yuanye Biotechnology Co., Ltd.	
H <sub>3</sub> PO <sub>4</sub>	AR	Sinopharm Chemical Reagent Co., Ltd.	

Supplementary table 1 Reagent

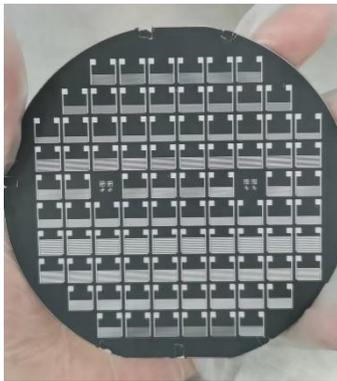
Supplementary Table 2 Instrument

Instrument/Equipment Name	Specification/Model	Manufacturer
Electrochemical Workstation	GAMRY Reference600+	GAMRY Instruments Co., Ltd.
Pipette Gun	10//100/1000 $\mu$ L	Eppendorf AG (Germany)
Analytical Balance	AS60	Radwag (Suzhou) Co., Ltd.
Magnetic Stirrer	LC-MS-M2	Shanghai Lichen Instrument Technology Co., Ltd.
Portable Multi-Parameter Colorimeter	DR900	Hach Water Quality Analytical Instruments (Shanghai) Co., Ltd.
Conductivity Meter	DJS-1-L	Shanghai Leici Instrument Factory Co., Ltd.
pH Meter	PHS-25	Shanghai Yidian Scientific Instrument Co., Ltd.
Water Purifier	UPTC 20L/H	Shanghai Lichen Instrument Technology Co., Ltd.

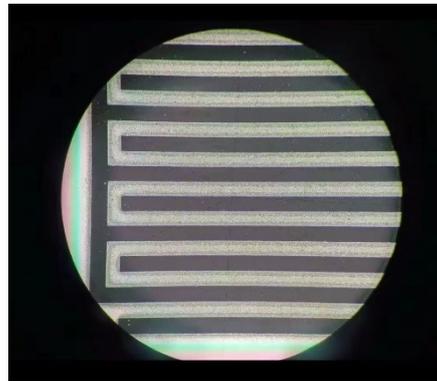


S1 Testing apparatus for sensing chips.

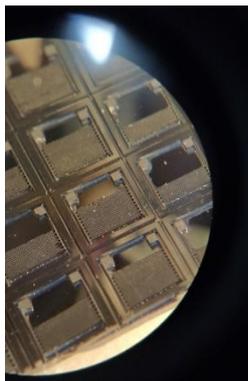
(a)



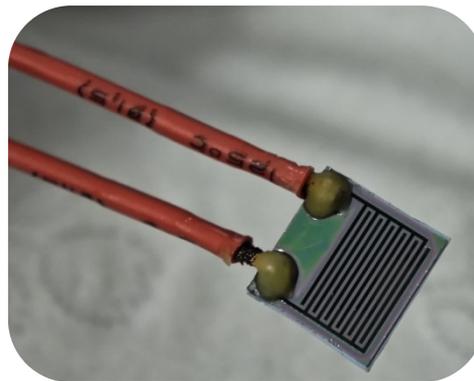
(b)



(c)

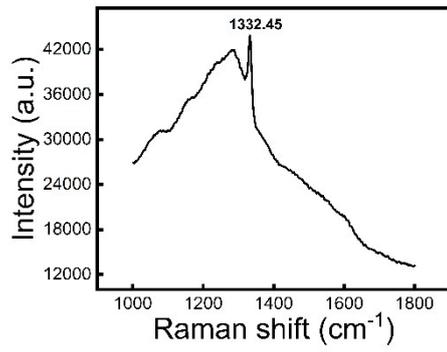


(d)

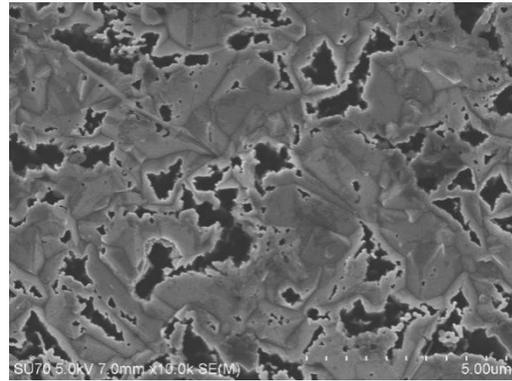


S2 (a) Sensing chip after photolithography; (b) Microscopic image of sensing chip after etching; (c) Microscopic image of sensing chip; (d) Physical image of sensing chip.

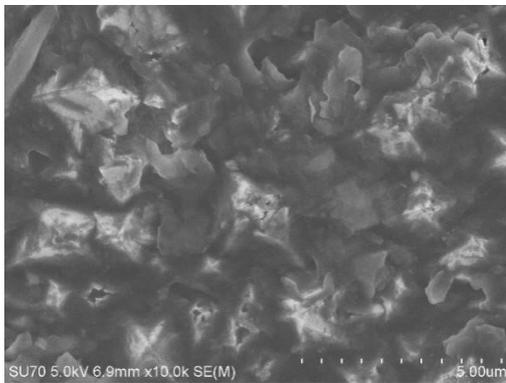
(a)



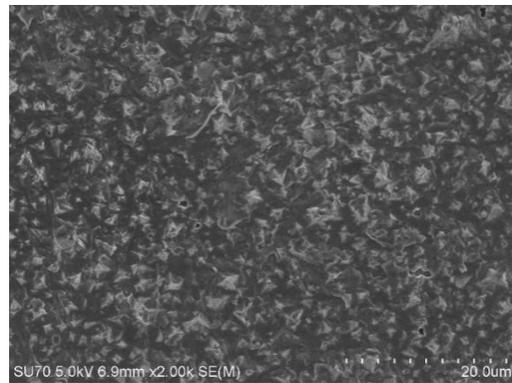
(b)



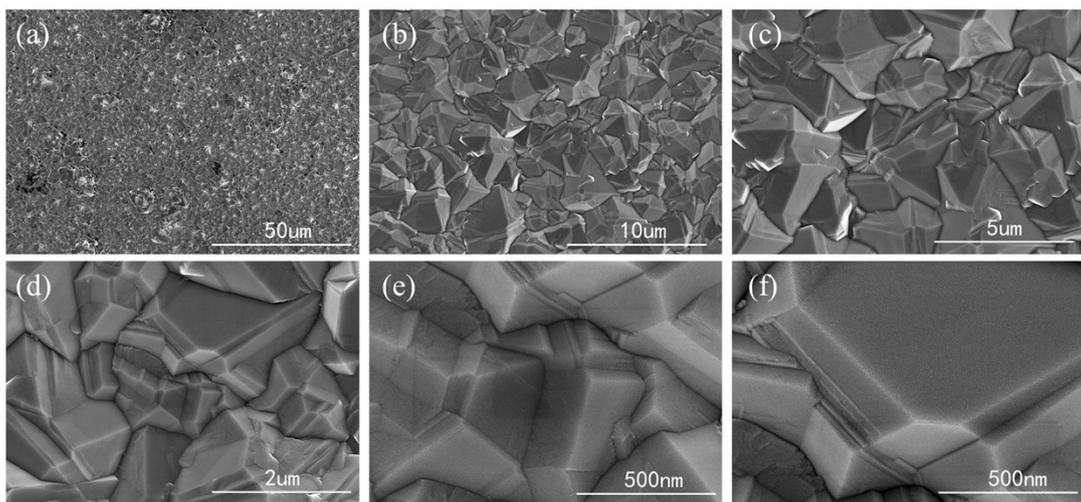
(c)



(d)



S3 Electrode Characterization Diagram (Raman and SEM).



S4 More detailed SEM characterisation images of the sensor electrode.