Supporting Information

Metal-like Single Crystalline Boron Nanotubes: Synthesis and In-situ Study on Electric Transport and Field Emission Properties

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Comparison of the conductivity of BNT with other individual nanostructures

In order to have a better statistic result on range of conductivity of individual BNTs, we have measured the electric I-V characteristics of 24 individual BNTs (Fig. 1S). Taking the averaged outer diameter as 30 nm, inner diameter as 20 nm and the mean length as 3 μm, the conductivity of individual BNTs are estimated, as given in Table SI. Table SI also lists the conductivity of other individual nanostructures obtained from in references for comparison. One can see in Figure S1 that almost all the I-V curves of 24 individual nanotubes are linear and their conductivity values lie in a narrow range (10^1~10^2 $\Omega^{-1}cm^{-1}$), revealing that all these nanotubes almost have similar conduction behaviors. Moreover, the conductivity of individual BNT has higher conductivity than that of most known cathode nanomaterials and is very close to that of some reported carbon nanotubes. Thus, BNTs have the metal-like properties as the predicted theoretically [SRef. 1].

Measurements of the luminance stability of Tube I and Tube II in operation

The luminance stability of luminescent tube is important and noteworthy technological issue in light-emitting devices. The luminance stability curves of the two tubes are given in Fig. S2. The whole measurement lasted for 2 hours and the initial luminance was set as 637 cd/m^2 for both tubes, which is high enough for general work modes. It is seen that the stability of Tube II (3 %) is slightly better than that of Tube I (7 %), which may be attributed to the better field emission performance of BNTs. Meantime, their luminance stability in operation is close to carbon nanotube luminescent tube [2], which suggests that boron nanostructure can be a new ideal cathode nanomaterial in luminescent tube applications.

Supplement References

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Figure and Table captions

Table SI Comparison of the room-temperature conductivity of individual BNT in our measurements with that of other individual nanostructures from references.

Fig. S1 Room-temperature electric transport I-E curves of 24 individual BNTs.

Fig. S2 Luminance stability curves of the two tubes at initial lumminance of 617 cd/cm^2 in operation.

Individual nanostructure		Conductivity ($\Omega^{-1}cm^{-1}$)	Reference
Boron nanotubes	1	13.356	This letter
	2	24.84	This letter
	3	37.26	This letter
	4	70.254	This letter
	5	58.572	This letter
	6	49.194	This letter
	7	58.842	This letter
	8	35.586	This letter
	9	66.168	This letter
	10	29.304	This letter
	11	38.052	This letter
	12	57.312	This letter
	13	60.948	This letter
	14	75.366	This letter
	15	43.632	This letter
	16	71.37	This letter
	17	68.922	This letter
	18	66.528	This letter
	19	37.404	This letter
	20	36.378	This letter
	21	38.448	This letter
	22	14.13	This letter
	23	12.168	This letter
	24	16.272	This letter
Boron nanowire (average value)		$5x10^{-3}$	3
BN nanotube		$3.3x10^{-3}$	4
Si nanowire		10^{-1}	5
ZnO nanorod		$8.5x10^{-3}$	6
V_2O_5 nanowire		0.5	7
Carbon nanotube		10^2-10^4	8-10

Table SI

(Fei Liu *et al.* submitted to J. Mater. Chem.)

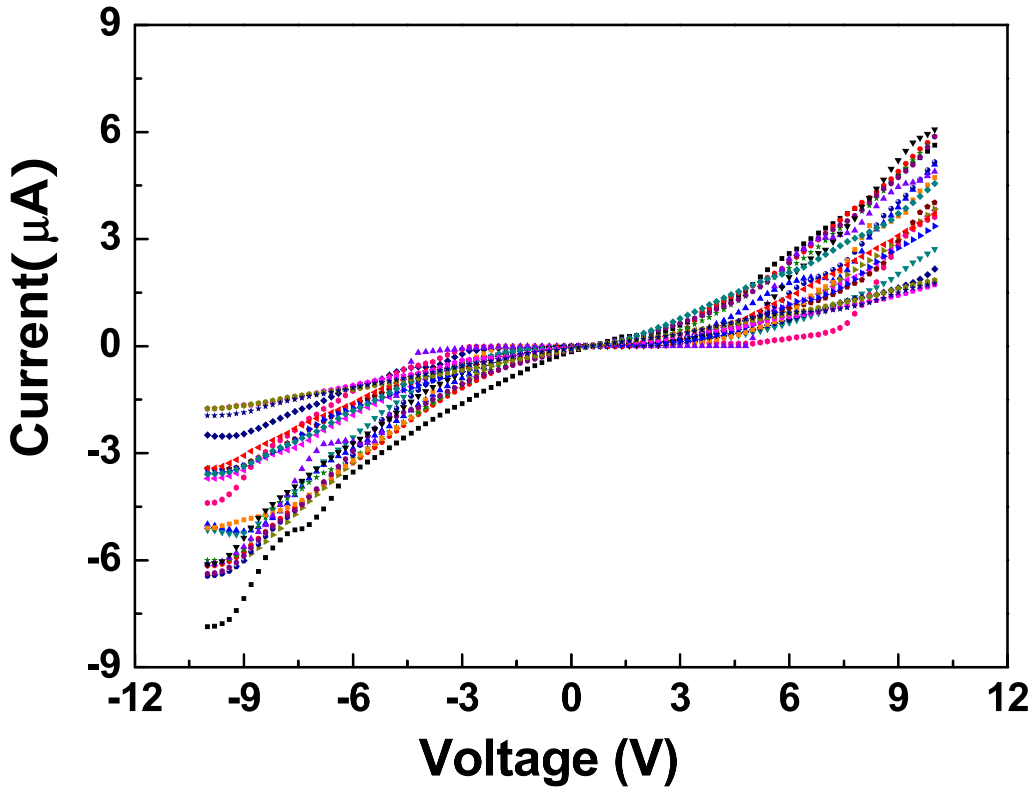

Figure S1

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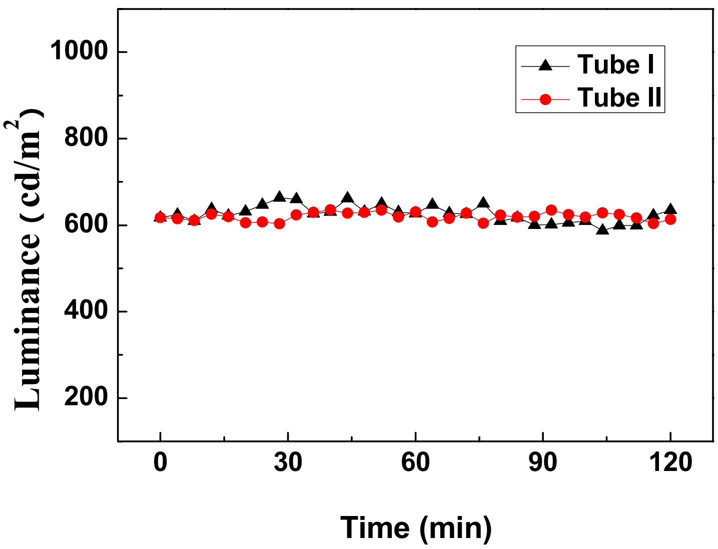

Figure S2

(Fei Liu *et al.* submitted to J. Mater. Chem.)