

## Supplementary Information

### Flow-induced Voltage Generation by Driving Imidazolium-Based Ionic Liquids over a Graphene Nano-Channel

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Fig. S1 presents the variation of total energy of the simulation system consists of [Emim][BF<sub>4</sub>] and graphene nano-channel with relaxation time steps. From Fig. S1, we can find the total energy of the simulation gradually decreases with the increasing of the simulation times then converges to a constant. So the simulation system can be regarded as reaching the equilibration.

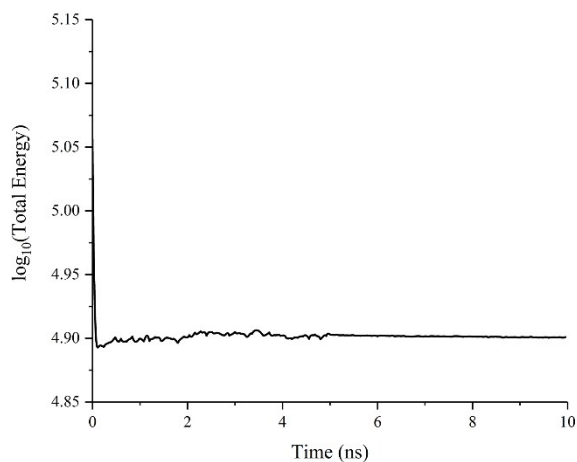


Fig S1. The variation of total energy of the simulation system consists of [Emim][BF<sub>4</sub>] and graphene nano-channel with relaxation time steps.

After the system reached the equilibration, to observe the spatial distribution of ions in x and y direction, we calculate the mean number density of ILs, cations and anions, plotted in Fig. S2. Clearly, the mean number of ILs fluctuates across a fixed value and no distinct layers occur close to graphene surfaces. It is not taking the ions distribution of ILs in x and y direction into consideration when calculating the flow induced voltage.

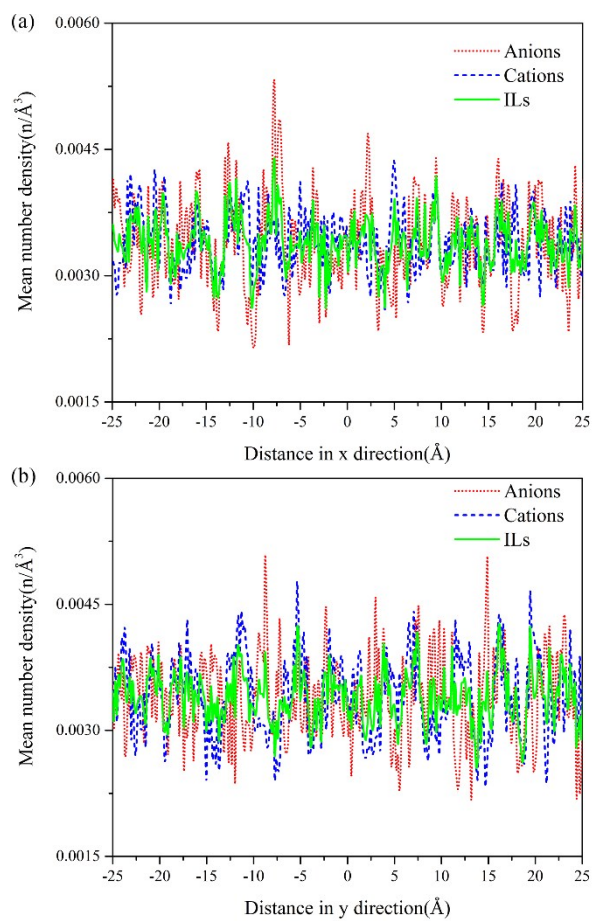


Fig S2. The mean number density of ILs, cations and anions in (a) x direction and (b) y direction: red shot dot line is anions, blue shot dash line is cations and green solid line is ILs.