

## ESI (Electronic Supplementary Information)

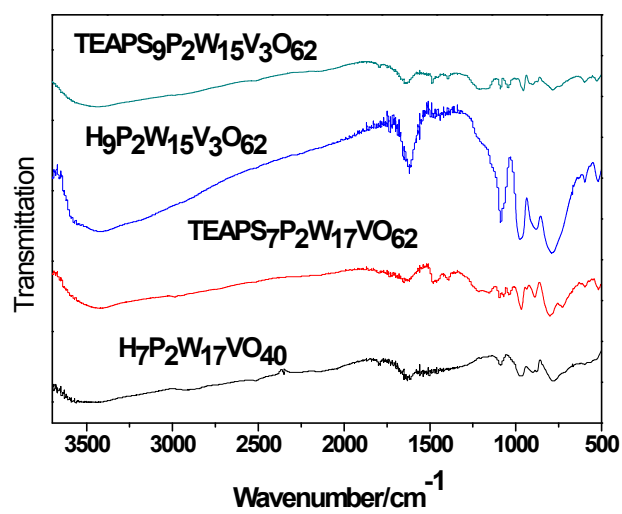
### **The invertible electrochemical properties and thermal reponse about a series of gel-type ionic liquids based on polyoxometalate**

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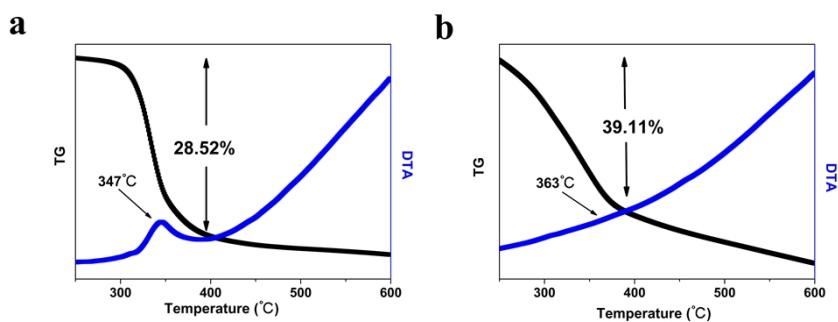
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**Fig. S1.** IR spectra of H<sub>7</sub>P<sub>2</sub>W<sub>17</sub>VO<sub>62</sub> and [TEAPSO]<sub>7</sub>P<sub>2</sub>W<sub>17</sub>VO<sub>62</sub>, with H<sub>9</sub>P<sub>2</sub>W<sub>15</sub>V<sub>3</sub>O<sub>62</sub> and [TEAPSO]<sub>9</sub>P<sub>2</sub>W<sub>15</sub>V<sub>3</sub>O<sub>62</sub>



**Fig. S2.** TG and DTA curves of  $[\text{TEAPS}]_7\text{P}_2\text{W}_{17}\text{VO}_{62}$  (a) and  $[\text{TEAPS}]_9\text{P}_2\text{W}_{15}\text{V}_3\text{O}_{62}$  (b) in the range from 250°C to 600°C.

Fig.S2 shows the decomposition of  $[\text{TEAPS}]_7\text{P}_2\text{W}_{17}\text{VO}_{62}$  and  $[\text{TEAPS}]_9\text{P}_2\text{W}_{15}\text{V}_3\text{O}_{62}$ . From these curves, we can find it that the volatilization of the ammoniums and degradation of the polyoxoanions to simple oxide. In fact, the TG trace shows an obvious weight loss of this series of compound, nearly 28.52 wt% of  $[\text{TEAPS}]_7\text{P}_2\text{W}_{17}\text{VO}_{62}$  and nearly 39.11 wt% of  $[\text{TEAPS}]_9\text{P}_2\text{W}_{15}\text{V}_3\text{O}_{62}$  at the temperature range which can both be corresponded to the proportion of MIMPS contained in this series of ionic liquids (27.13 wt % and 40.31 wt% ). In addition, the exothermic peaks at 347°C or 362°C are the decomposition temperature of POMs, where POM anions are degraded to the simple metal oxide.