

## Temperature Dependent Polarization Effect and Capacitive Performance Enhancement of PVA-Borax Gel Electrolyte

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In this paper the space-polarization effect and capacitive performance enhancement have been reported of Polyvinyl Alcohol (PVA)-Borax gel electrolyte. To improve structural and electrochemical performance the anionic  $\text{Cl}^-$  and cationic  $\text{Na}^+$  were doped into PVA-Borax system via NaCl salt. The structural studies showed that there is no any impurity phase formation in PVA-Borax structure with NaCl dopes. It was determined that NaCl dopes affect the  $\text{B}(\text{OH})_4^-$  anionic structure in the PVA-Borax system. As a result of electrochemical CV measurements, in (-1) - (+1) voltage range, the samples showed rectangular shape current property as a supercapacitor electrolyte. According to capacitance results, the highest capacitance value was obtained as  $0.082 \text{ F g}^{-1}$  with 5 mmol NaCl doped sample at room temperature. In the long cycle life measurements, 1 mmol NaCl doped sample showed more stable capacitance behavior. The temperature depending capacitance measurements showed that the PVA-Borax gel electrolyte has space-polarization effect. Also, both anionic and cationic dopes via NaCl has a positive effect on capacitive performance of PVA-Borax gel electrolyte and it provides advantages to technological capacitor applications.

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**Keywords:** PVA-Borax, anionic dope, cationic dope, supercapacitor.

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