

## Electronic Supplementary Information

### Highly durable, perfluorinated Q (PFBE-co-VBC) and PVDF blend anion exchange membranes with interconnected morphological features for electrochemical energy conversion systems<sup>†</sup>

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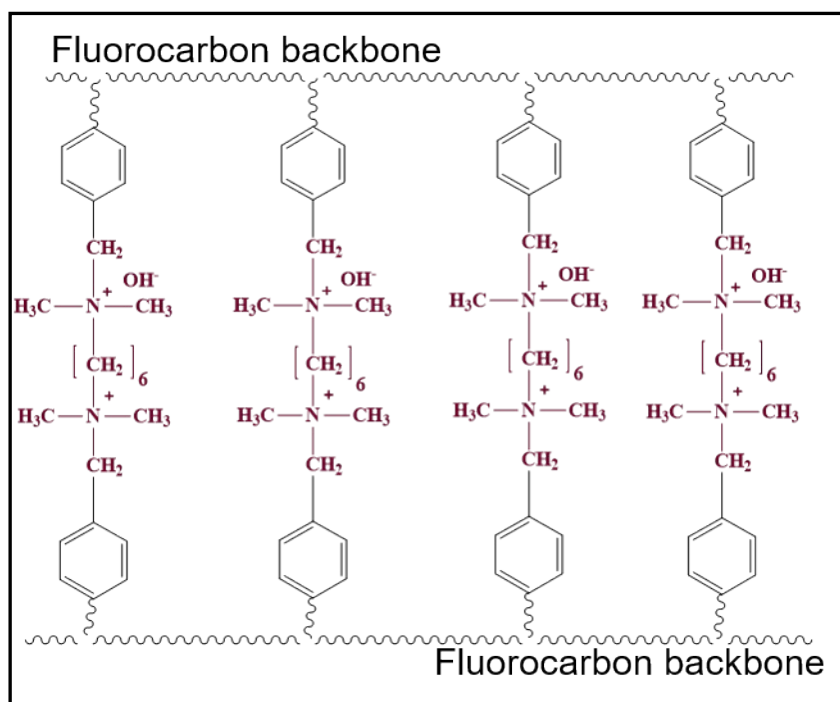
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Scheme S1. Cross-linked, interconnected network structure of anion exchange polymer

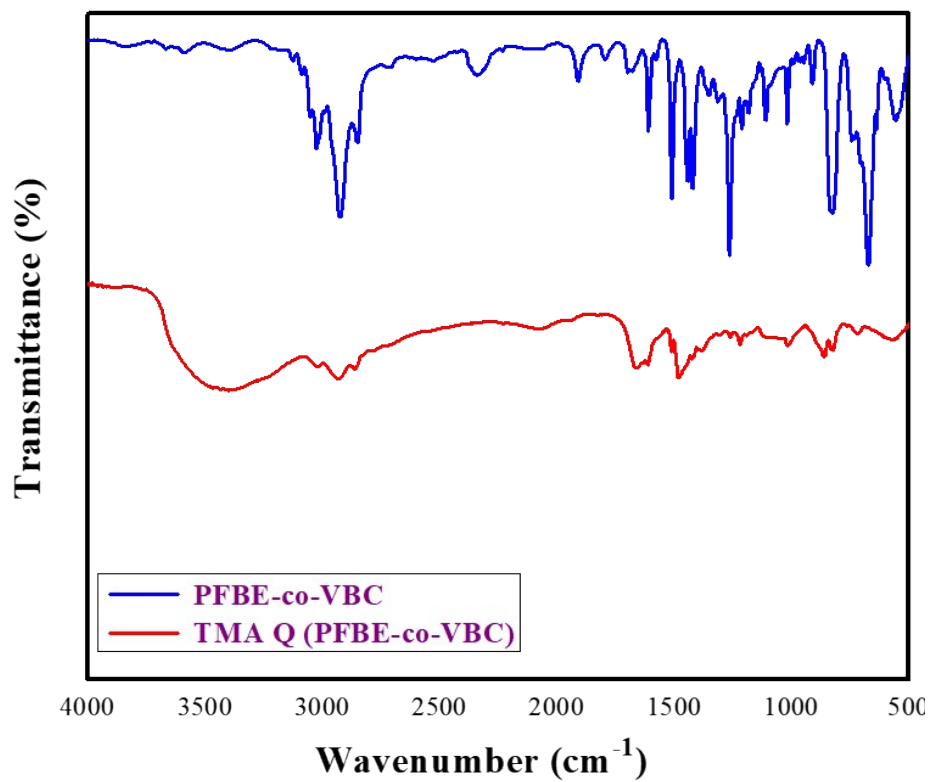


Figure S1. FTIR spectra of (PFBE-co-VBC) and quaternized TMA Q (PFBE-co-VBC) copolymers

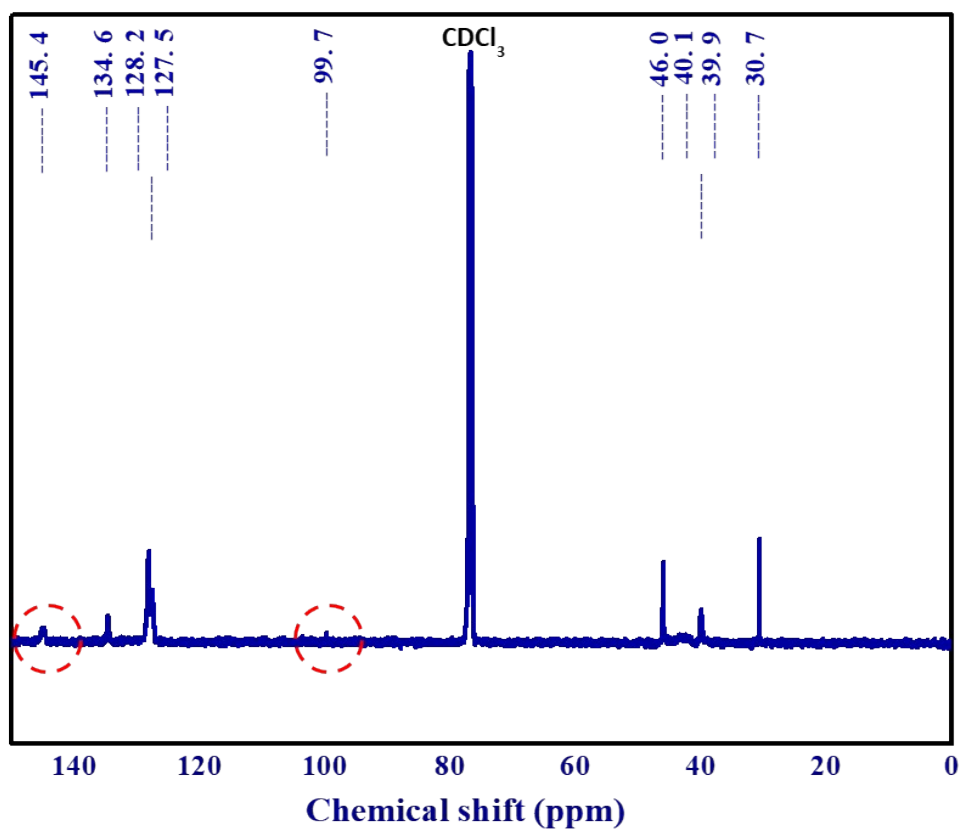


Figure S2.  $^{13}\text{C}$ -NMR spectrum of (PFBE-Co-VBC) co-polymer with PVBC and VBC ratio 3:1

Aromatic hydrocarbon (VBC): 39.9 ppm, 40.1 ppm, 46.0 ppm, 127.5 ppm, 128.2 ppm, 134.6 ppm

Fluorocarbon (PFBE): 30.7 ppm, 40.1 ppm, 99.7 ppm, 145.4 ppm

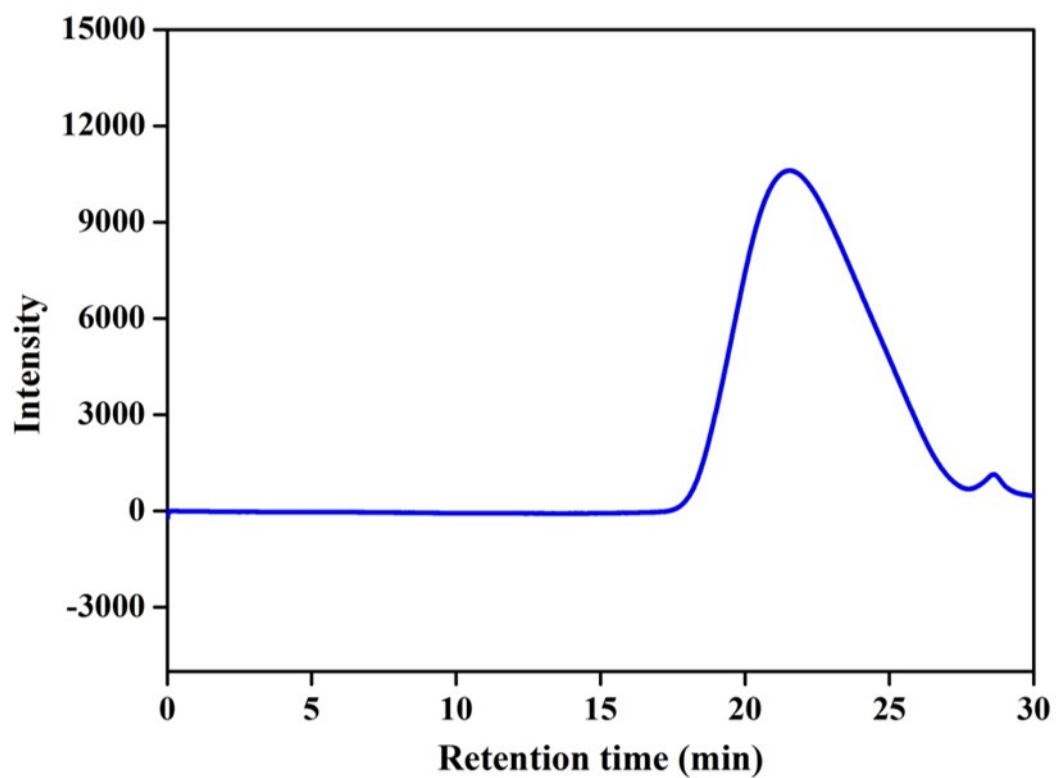


Figure S3. GPC chromatogram of (PFBE-co-VBC) co-polymer with PVBC and VBC ratio 3:1

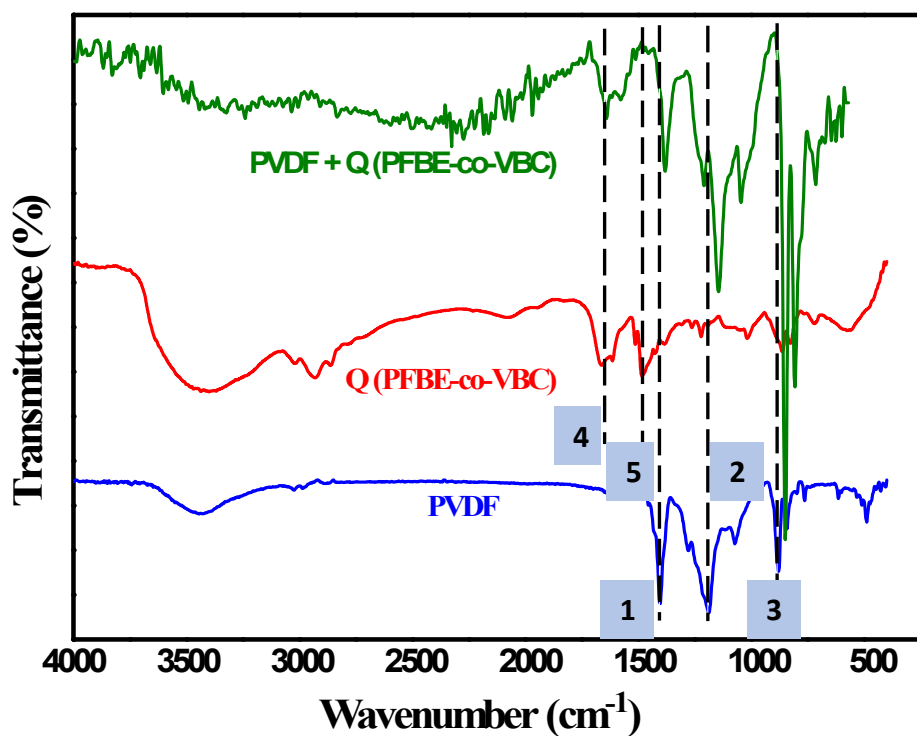


Figure S4. FTIR spectra of PVDF, Q (PFBE-co-VBC) polymers and PVDF - Q(PFBE-co-VBC) blend membranes

Peak position	Wave number	Peak assignments
1	1402 $\text{cm}^{-1}$	C-F stretching vibration (PVDF)
2	1188 $\text{cm}^{-1}$	$\text{CF}_2$ symmetrical stretching (PVDF)
3	880 $\text{cm}^{-1}$ & 840 $\text{cm}^{-1}$	Mixed mode of $\text{CH}_2$ rocking and $\text{CF}_2$ asymmetrical stretching (PVDF)
4	1660 $\text{cm}^{-1}$	C=C stretching (VBC of Q(PFBE-co-VBC))
5	1480 $\text{cm}^{-1}$	C-F stretching (PFBE of Q(PFBE-co-VBC) )

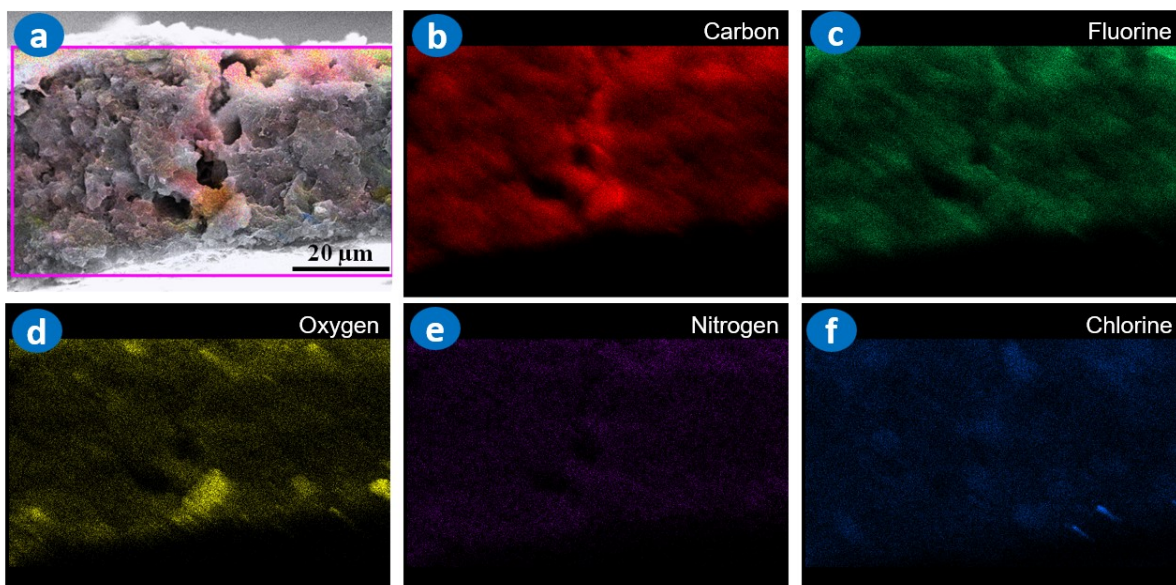


Figure S5. (a) FE-SEM cross-sectional image and (b), (c), (d), (e), (f) elemental mapping images of PVDF - Q (PFBE-co-VBC) blend membrane with 1: 0.33 ratio



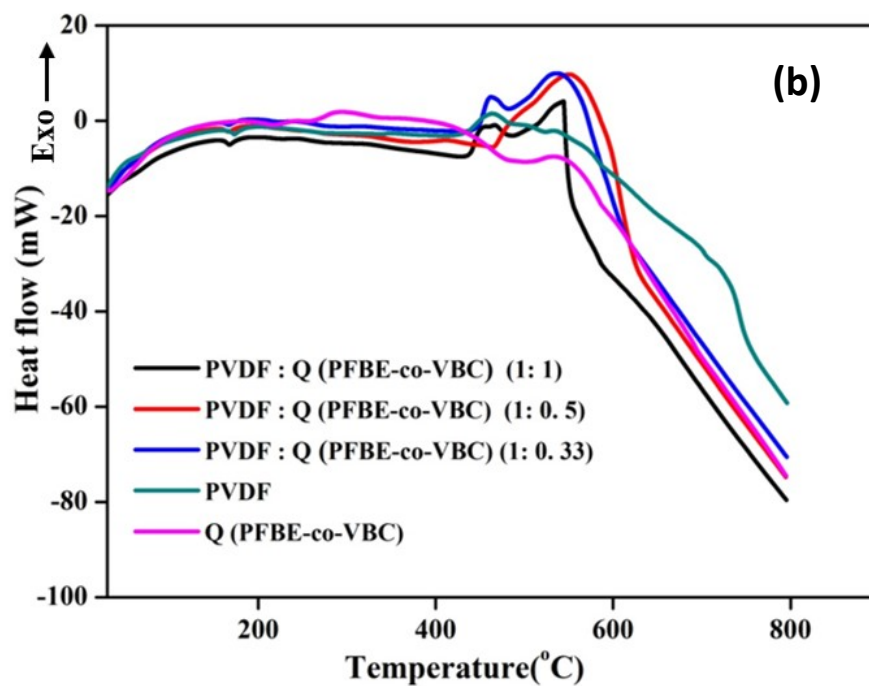
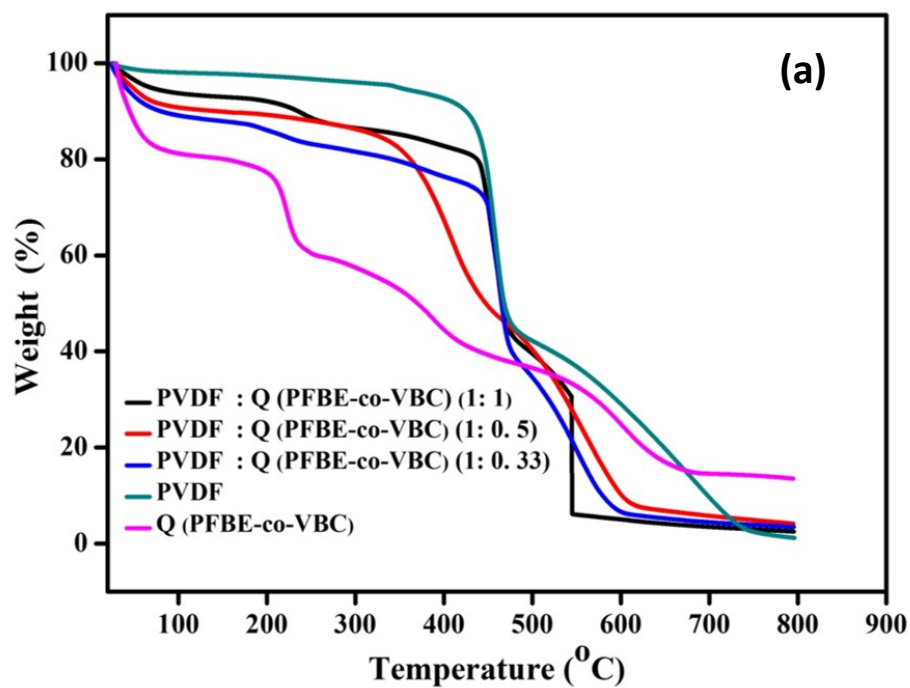


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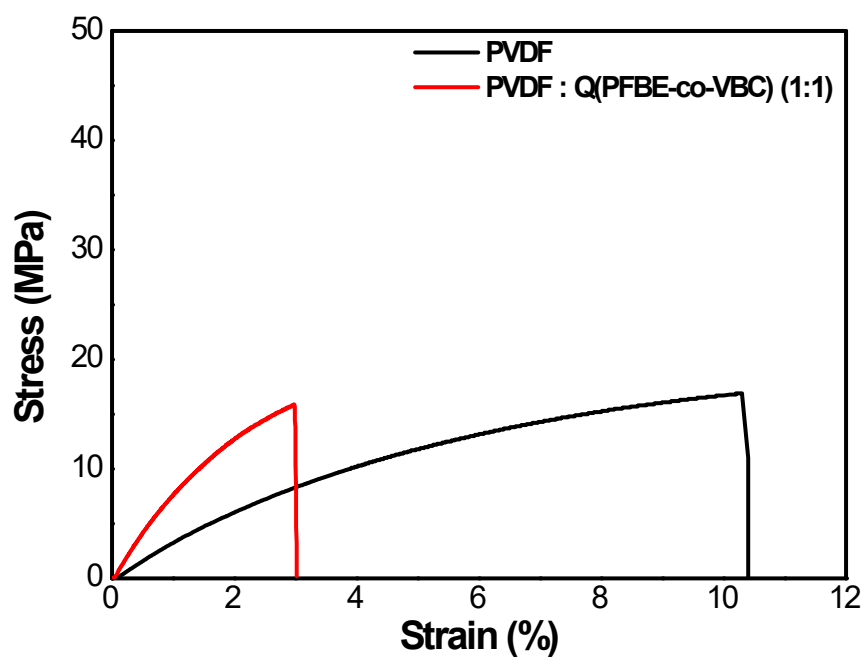


Figure S7. Tensile properties of PVDF - Q (PFBE-co-VBC) blend anion exchange membrane with 1:1 ratio

Membrane	Tensile Modulus (MPa)	Ultimate stress (MPa)	Elongation (%)
PVDF – Q (PFBE-co-VBC) (1:1)	5.1	16.2	3.2
PVDF	1.7	14.0	8.2

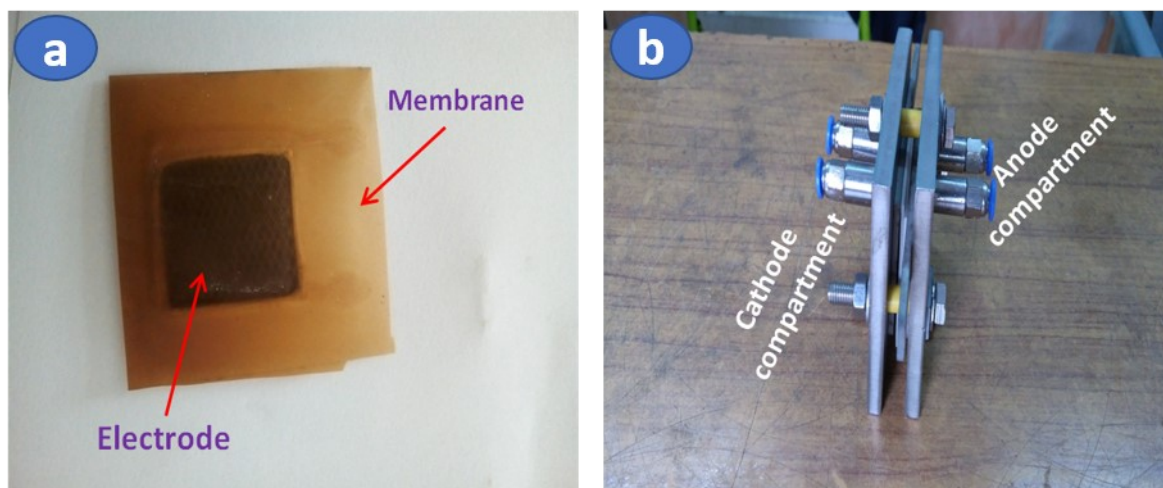


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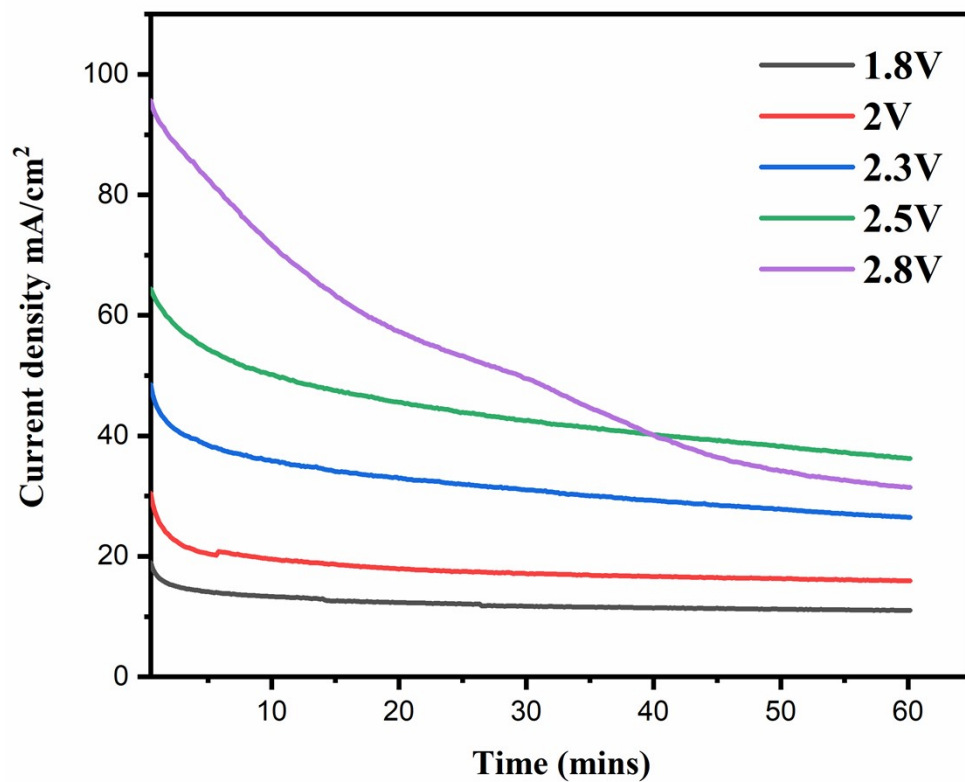


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