





1. S1. Physical properties of membrane with different weight ratios of PVdF-SiO₂

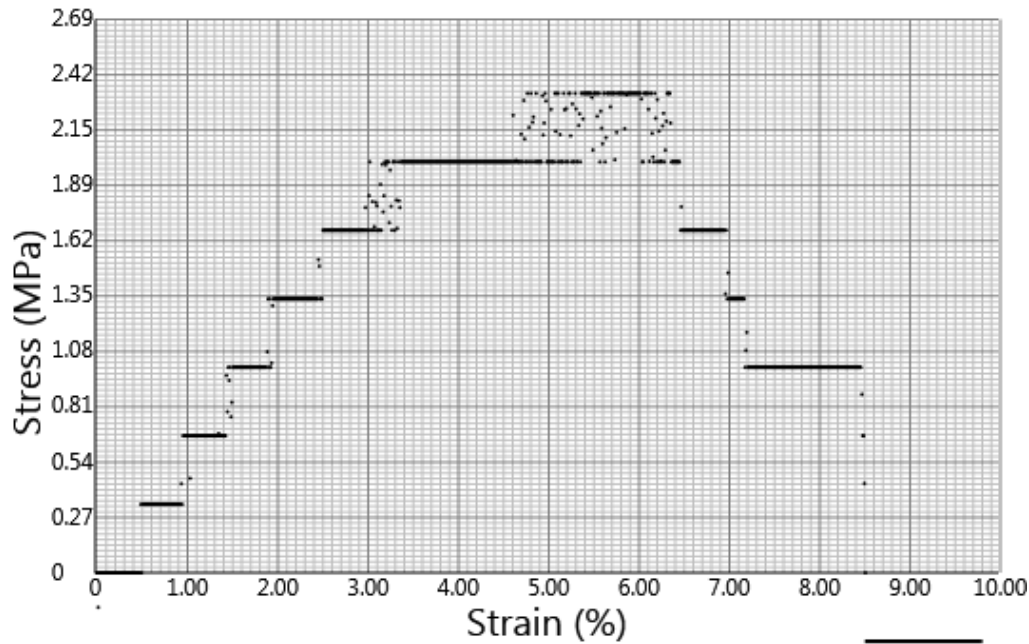
S.no	PVdF-SiO ₂ (Weight %)	Physical appearance of membrane	Flexibility of membrane	Digital image of membrane
1	50-50	Milk white in color/rigid	More brittle	
2	70-30	Milk white in color/rigid	brittle	
3	80-20	Milk white in color/soft	flexible	
4	90-10	Milk white in color/soft	More flexible	

2. ST1 Comparison of separator thicknesses with commercial thickness.

S.No.	Type of separator	Thickness (μm)
1	Celgard Polypropylene 2400 (PP) Monolayer	50
2	NKK cellulose(TF40)	35
3	PVdF-SiO ₂	90-110

3. Mechanical stability of as prepared PVdF-SiO₂ membrane with electrolyte solution

The mechanical stability of electrolyte membrane soaked in electrolyte solution was determined using Methact Generic Tensile-stress vs strain measurement system, (from National Test House version 10.2.0.0), and the stress value of 2.33 MPa with moderate elongation of 9.81% was observed.



4. Mechanical stability of membrane different ratios PVdF-SiO₂.

The mechanical stability of prepared membrane was obtained for samples of ratio (a) 90:10%, (b) 80:20% PVdF-SiO₂ contents respectively. The membrane of PVdF-SiO₂ 90:10% shows high mechanical stability by means of higher stress value around 4.67 MPa with total elongation around 9.41%. The sample of 80:20% PVdF-SiO₂ ratio shows low stress value 3.33 MPa with elongation of 7.42% when compared to 90:10% PVdF-SiO₂ membrane. From the observation when reach the certain amount of SiO₂ content in the PVdF polymer matrix reduce mechanical

stability of membrane due to the steric effect. The membrane with 70:30, 50:50% of PVdF-SiO₂ are brittle so the samples are not suitable for experiment.

