Fabrication of 2D vanadium MXene polyphenylsulfone ultrafiltration membrane enhancing the water flux and for effective separation of humic acid and dyes from wastewater.

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S1. Synthesis of Vanadium MXene (V_2CT_x)

10 mL of HCl was added to 120 mL polypropylene (PP) bottle and in the next step 20 mL 40% HF was added carefully following all the necessary safety precautions in relation with highly corrosive HF. The PP bottle was kept in an ice bath and 1 gm V_2AlC was added gradually for a time period of 15 minutes. Experimental setup image during the addition of V_2AlC was given in the Figure S1. After the addition of V_2AlC powder the PP bottle was kept in an oil bath and the mixture was stirred for 84 hours at 80°C. All the contents inside the PP bottle was transferred to 50 mL centrifuge tube and centrifuged at 3500 rpm for 5 minutes. Discarded the supernatant, sediment was dispersed in 40 mL of DI water and centrifuged. Repeated the same

procedure until supernatant crossed pH 5. The contents of the centrifuge tube are filtered to obtain V2CTx Mxene nanosheets. The obtained residue was dried by keeping it on a vacuum oven at 60°C for 50 hours. The dried V_2CT_x powder was used for all the characterization and membrane fabrication.

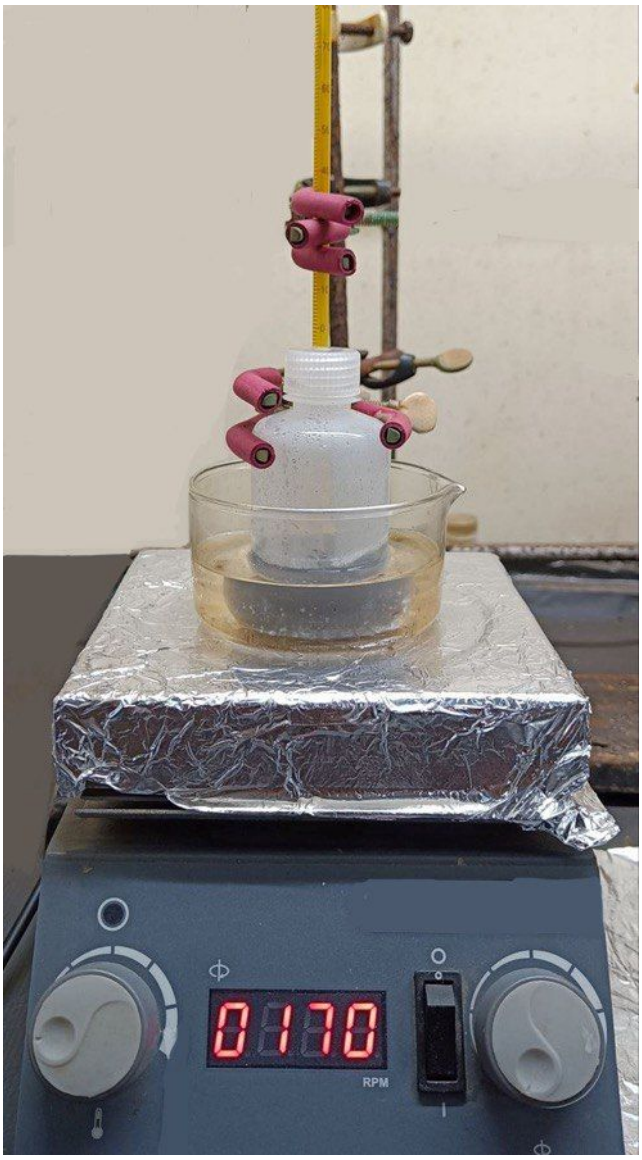

Figure S1. Experimental setup for etching of Al from V_2AlC.