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Supplementary Materials for

Elastic properties of 2D $Ti_3C_2T_x$ MXene monolayers and bilayers

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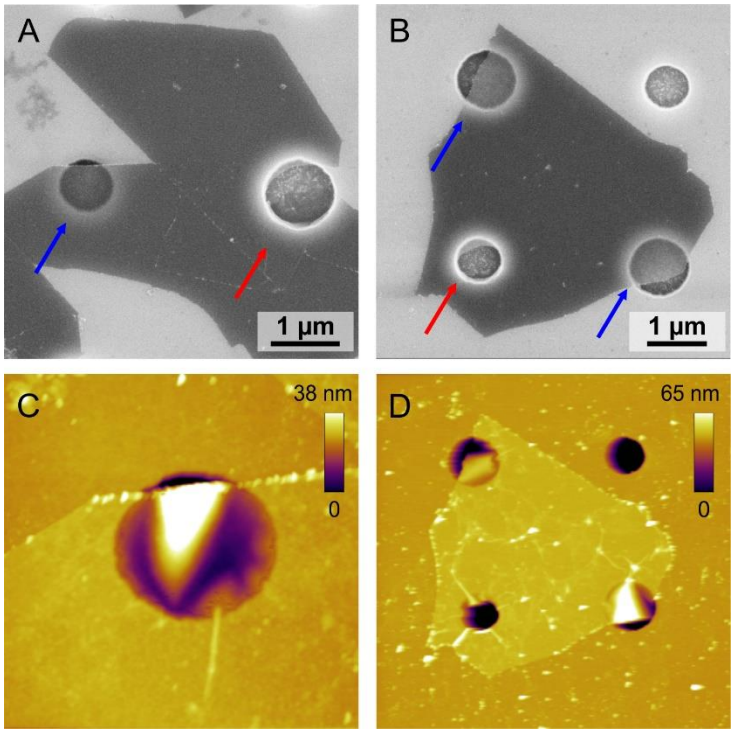

fig. S1. $Ti_3C_2T_x$ MXene membranes prepared by drop-casting from an aqueous solution. (**A, B**) SEM and (**C, D**) corresponding AFM images of $Ti_3C_2T_x$ MXene flakes deposited on a Si/SiO_2 substrate with micro-wells *via* drop casting from an aqueous solution. When flake covers a well during drying, surface tension of water fractures the membrane, see red arrows. Partially covered micro-wells (blue arrows) survive drying but yield crumpled membranes that cannot be used for indentation experiments.

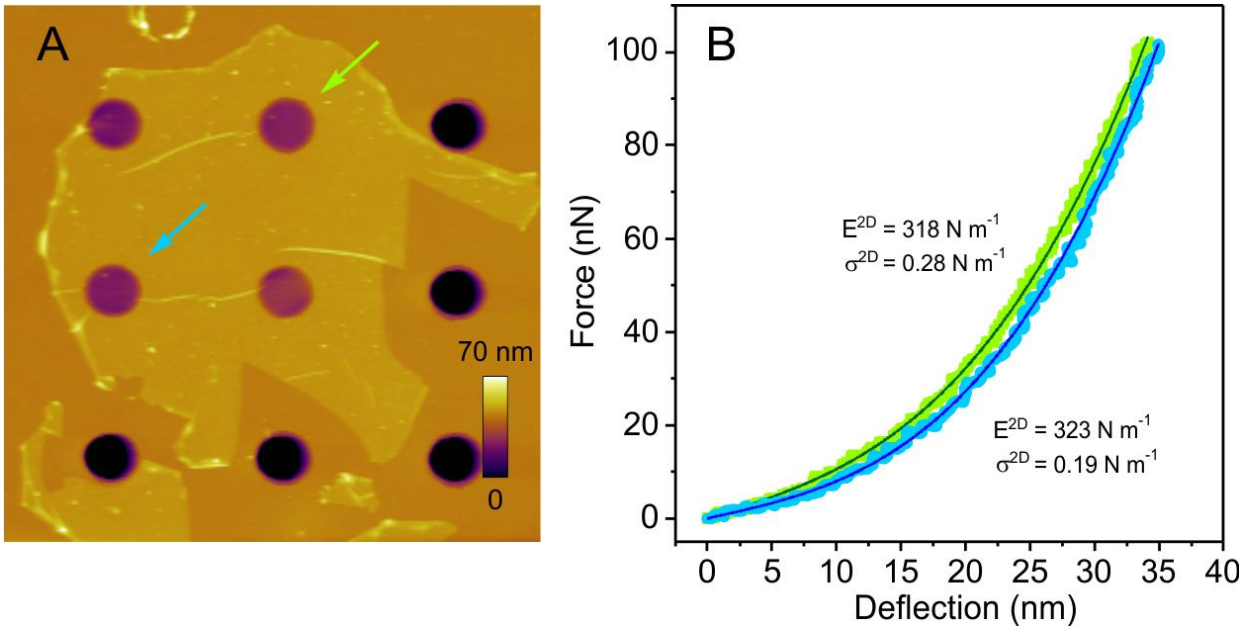

fig. S2. Mechanical properties of $Ti_3C_2T_x$ MXene monolayer on a single flake. (**A**) Survey AFM image of a substrate showing four membranes formed by one monolayer $Ti_3C_2T_x$ flake. Two of them were used for the elasticity measurements. (**B**) Force – deflection curves of MXene membranes shown in (A); the colors of the curves match the colors of arrows in (A). The least squares fit to the experimental indentation curve showed very close E^{2D} values for these two membranes. Different pretension values cause the slight difference in the force – deflection curves.

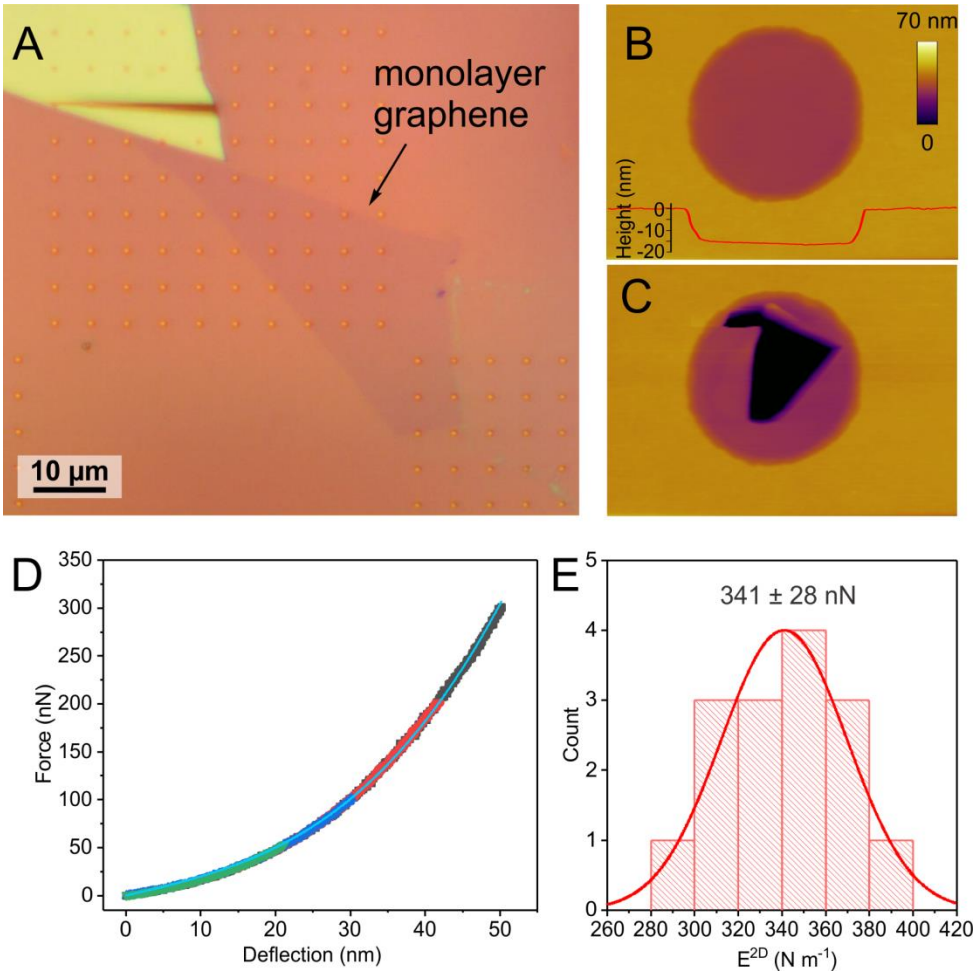

fig. S3. Mechanical properties of graphene monolayers. (**A**) Optical images of exfoliated monolayer graphene flake on Si/SiO_2 substrate with prefabricated wells with a diameter of 0.82 µm. (**B, C**) AFM images of a graphene-covered well (B) before and (C) after fracture. (**D**) Force - deflection curves of one of the graphene membranes at different loads. The least squares fit to the experimental indentation curve was performed using Eq. 1 in the main text. (**E**) Histogram of the elastic stiffness values for monolayer graphene membranes. Solid line represents Gaussian fit to data.