

Electronic Supplementary Information

Room temperature curable Inorganic-Organic hybrid nanocomposite hydrophobic coating: Mechanistic understanding the role of Ti (IV) and diamine based curing agent

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Table S1 **Shelf-life and viscosity of the sols and WCA values with varying coating composition in tabular form.**

Sol Name	TiO ₂ /SiO ₂	Shelf-life (Days)	Viscosity (MPa.s) attained after aging (shelf life days)	WCA Value after cured at 90 °C
TC-1	0.06	70	22	105±2 ⁰
TC-2	0.08	60	22	107±2 ⁰
TC-3	0.11	50	23	108±2 ⁰
TC-4	0.15	40	25	104±2 ⁰
TC-5	0.19	30	27	102±2 ⁰

Table S2 Variation of shelf-life and viscosity of the sols prepared by different amount of curing agent along with WCA value of the RT cured coatings.

Sol Name	Curing agent/hardener (mmol)	Shelf-life (Days)	Viscosity (MPa.s) attained after aging (days)	WCA value of RT cured after 24 h
RT-1	0.36	60	22	93 ±2 ⁰
RT-2	0.50	45	23	96 ±2 ⁰
RT-3	0.89	20	24	104 ±2 ⁰
RT-4	1.07	3	26	101 ±2 ⁰

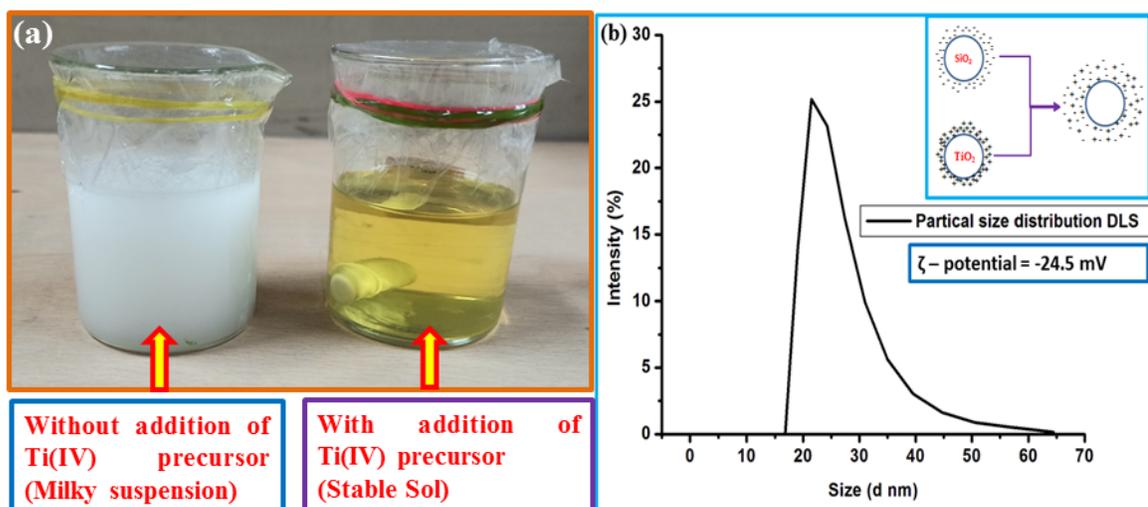


Fig. S1. (a) RT cured stable inorganic-organic hybrid sol containing with or without presence of Ti(IV) precursor **and** (b) particle size distribution of TC-3 solution (DLS).

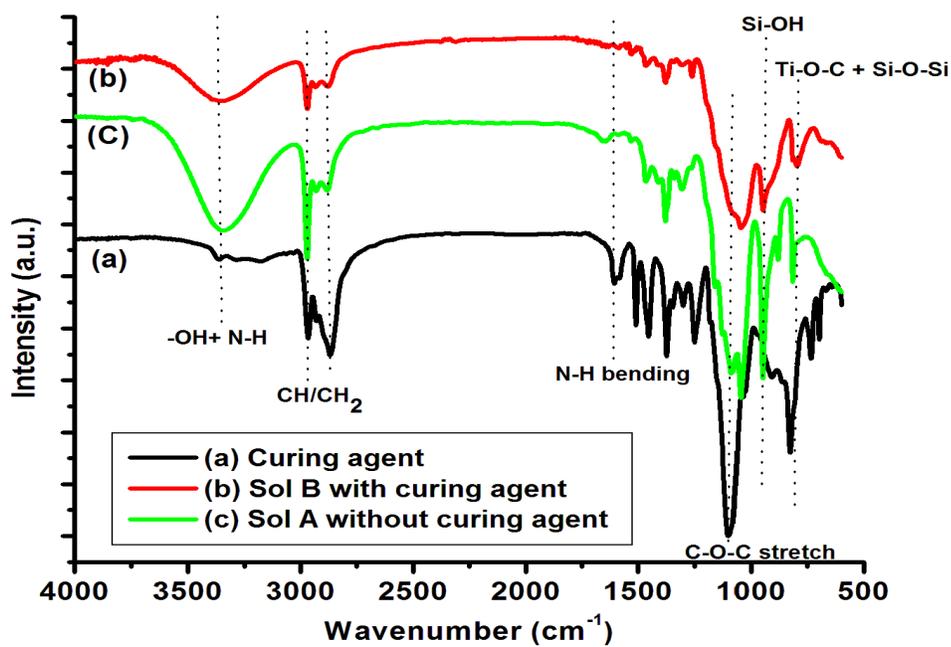


Fig. S2. ATR-FTIR spectra of (a) curing agent, (b) Sol-B; with curing agent and (c) Sol-A; without curing agent.

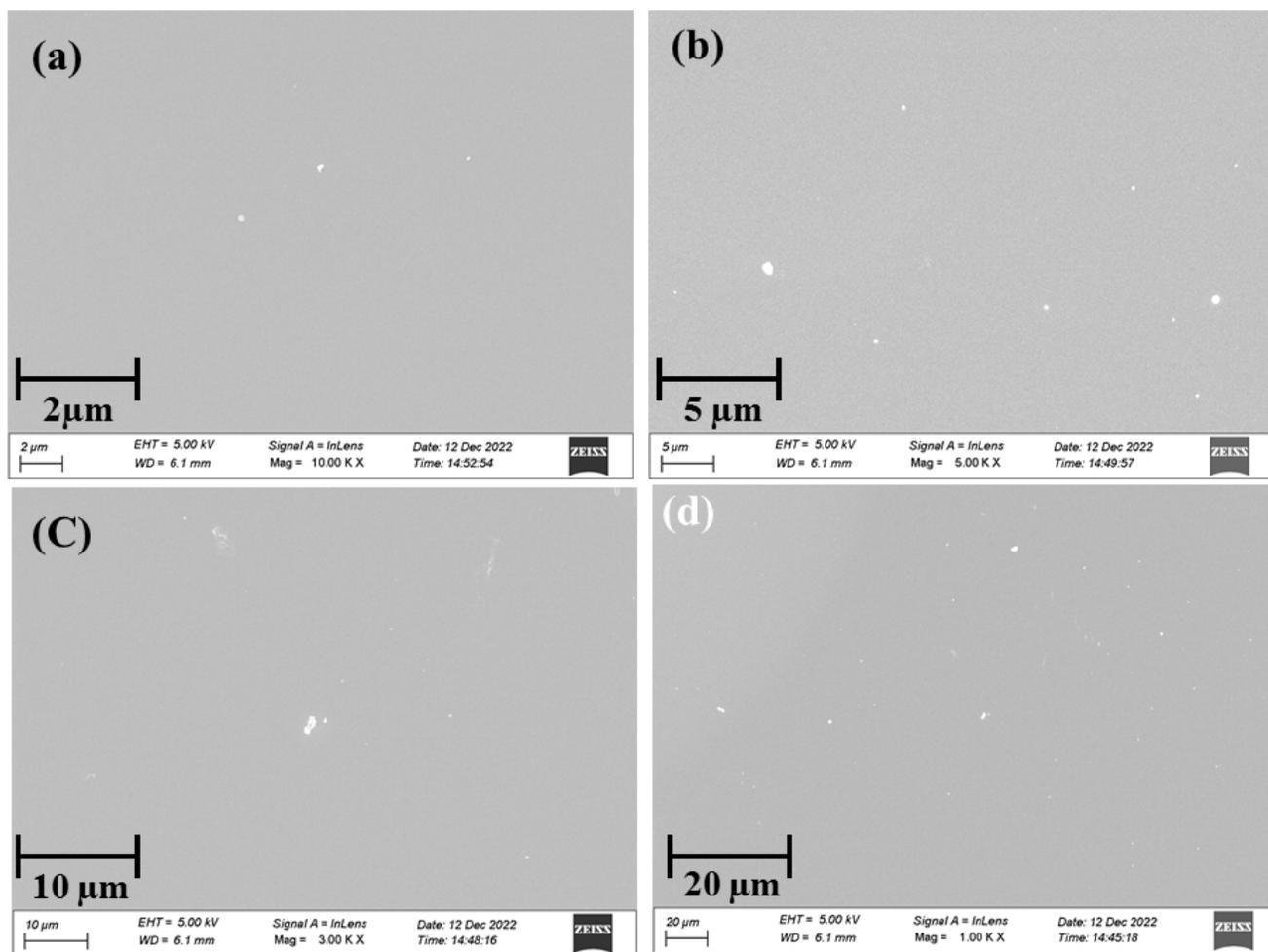


Fig. S3 FESEM of RT cured surface taken at different magnifications.

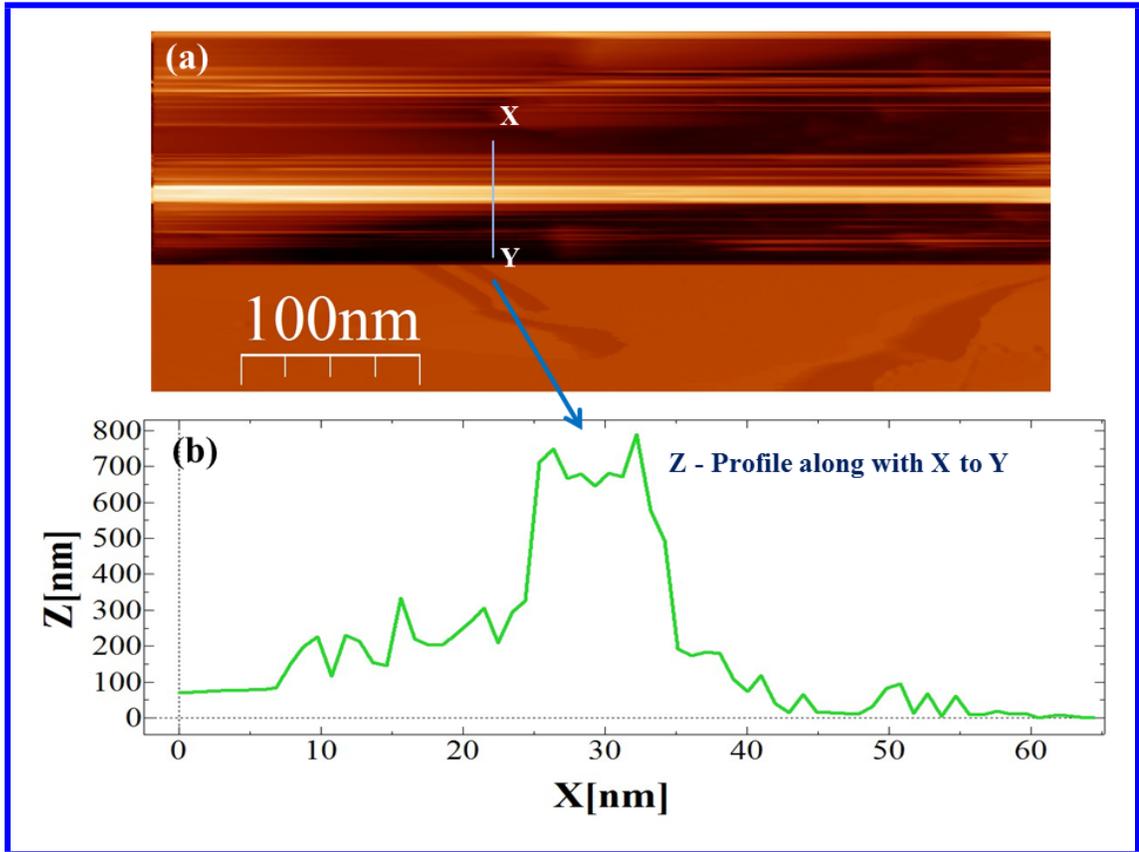


Fig. S4 Measurement of coating thickness using AFM: (a) 2D images of AFM and (b) Z – profile across the coated and uncoated line (X to Y).

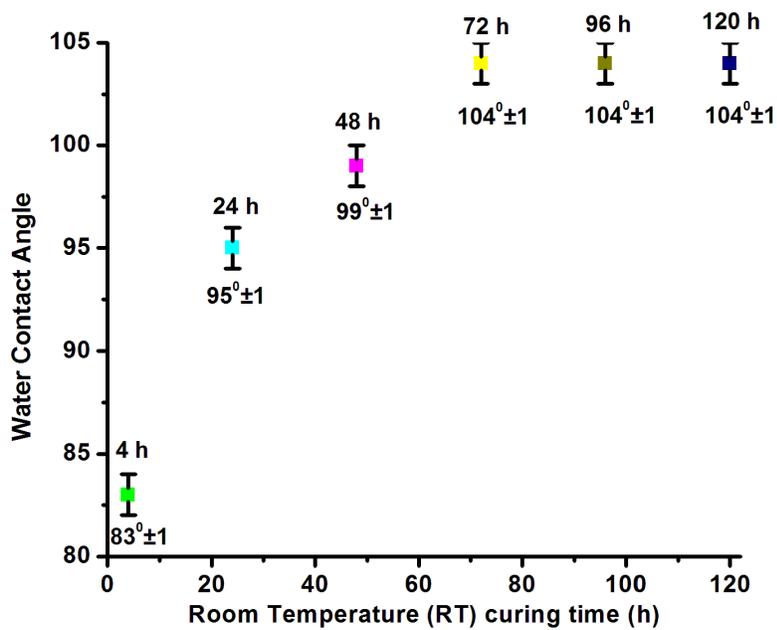


Fig. S5 Changing of WCA values with RT cured time.

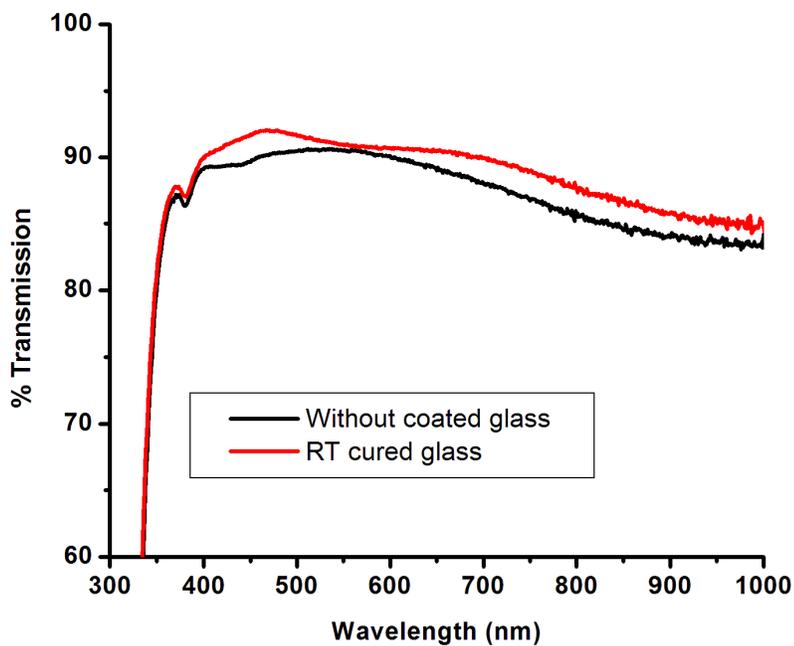


Fig. S6 % Transmission spectra of RT cured coated and uncoated surface onto glass substrate.

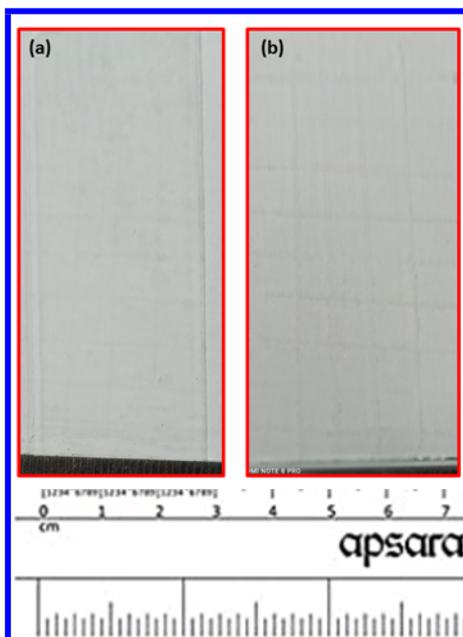


Fig. S7 Photographs of (a) before and (b) after cross-cut adhesion test of the RT cured coatings.



Fig. S8 Evaluation of hardness of RT coated tiles surface using pencil hardness tester (BYK Gardner instrument).

Method:

Pencil hardness of the coated surface was evaluated following ASTM D 3363 specifications using a pencil hardness tester (BYK Gardner instrument). The pencil hardness value is given according to grade of pencil such as 9B to 9H. For testing the sample, first pencil is inserted into the machine then it must touch the test surface, and is tighten the lamping screw. Then pencil is moved over the surface about 6-12 mm under a fixed load of 750 gm and a fixed angle of 45 degrees. The test is repeated using successive grade pencils where one does not scratch and next one does scratch. The pencil grade for which it does not scratch the sample is the value of hardness. . In this case no scratch was observed using 5H pencil as shown in red circle (Figure S8)

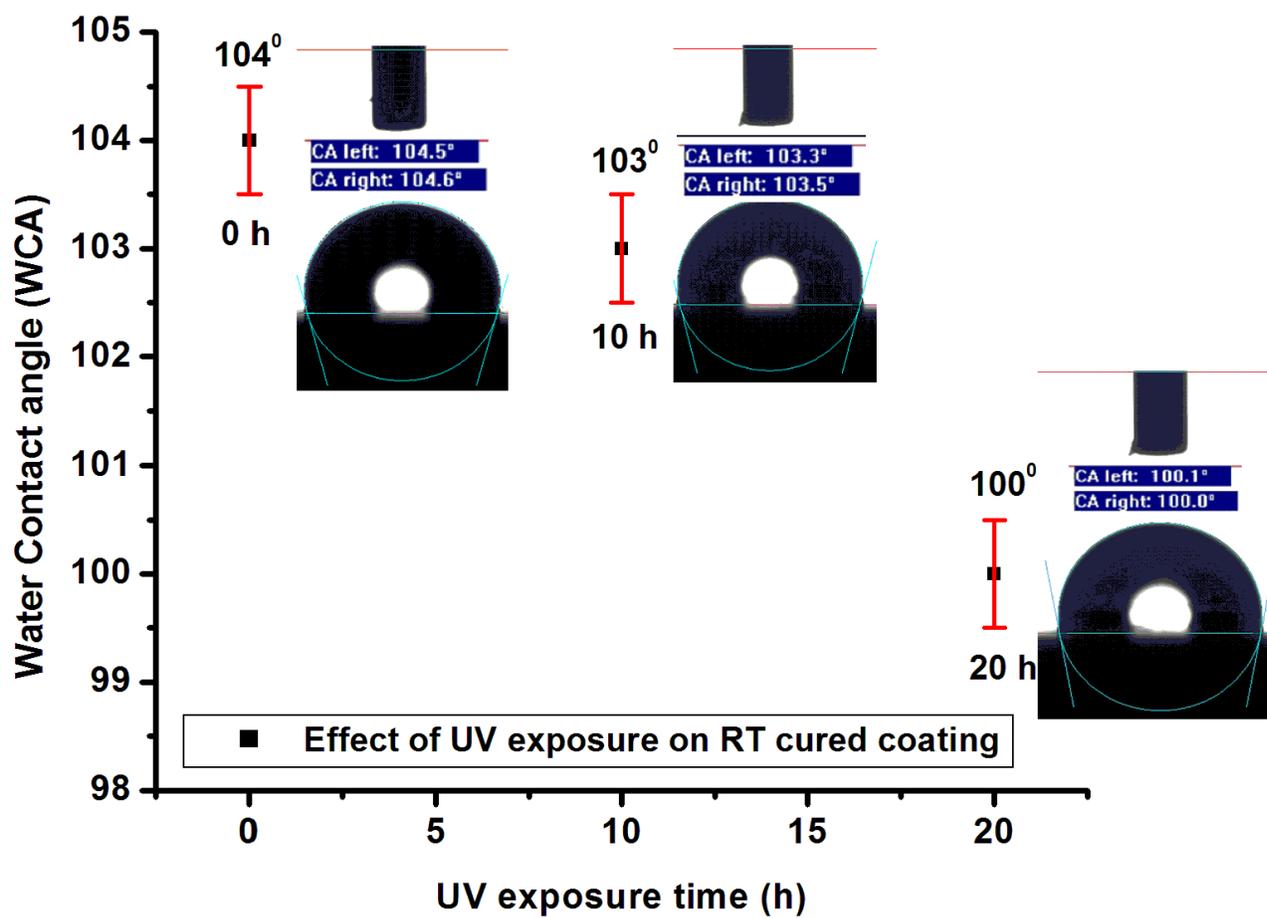


Fig. S9 Effect of UV exposure on RT cured coating surface.

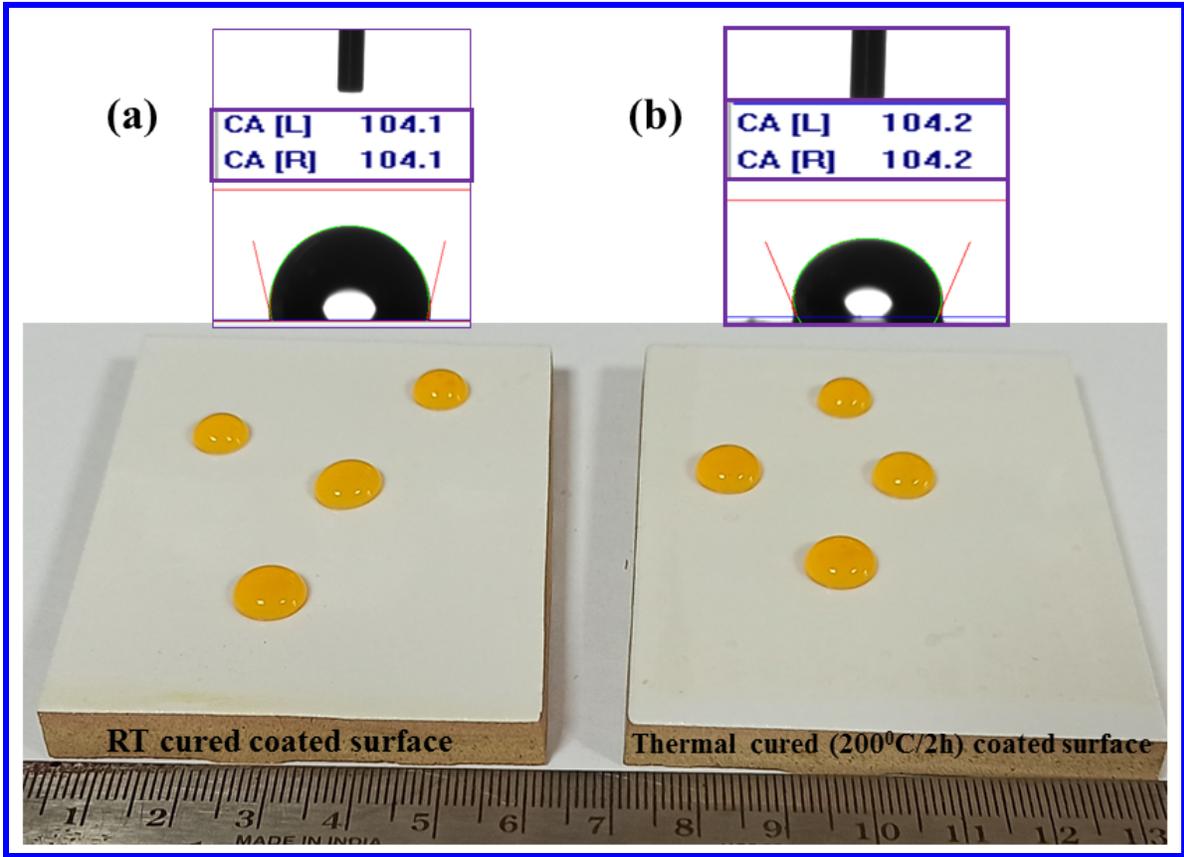


Fig. S10 Water droplets on (a) RT cured coated surface and (b) thermal cured (200⁰C/2 h) coated surfaces.

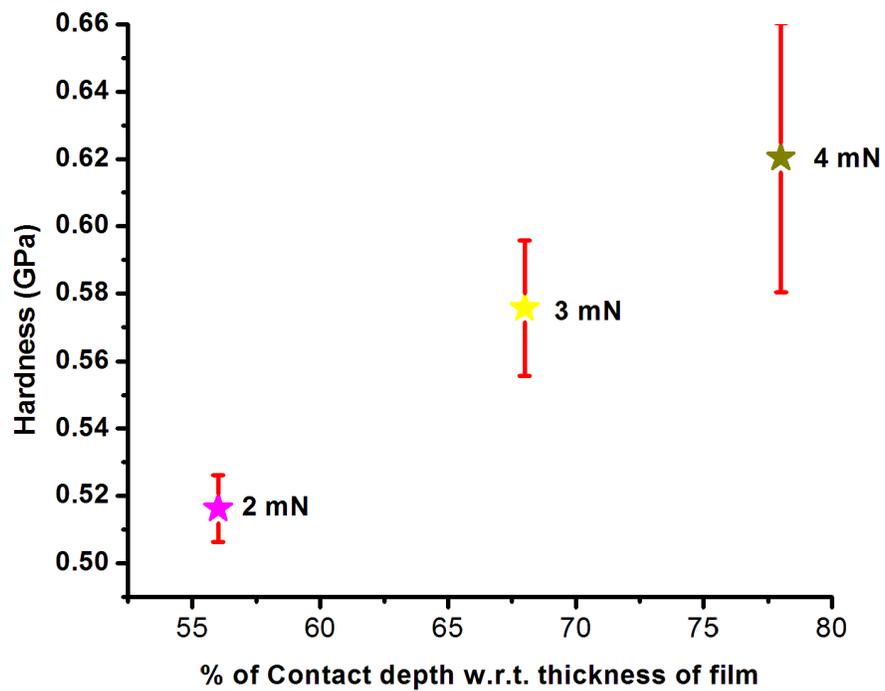


Fig. S11 Plot of hardness versus normalized contact depth, w.r.t. film thickness.