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Supporting Information

# Oxide removal and stabilization of bismuth thin films through chemically bound thiol layers

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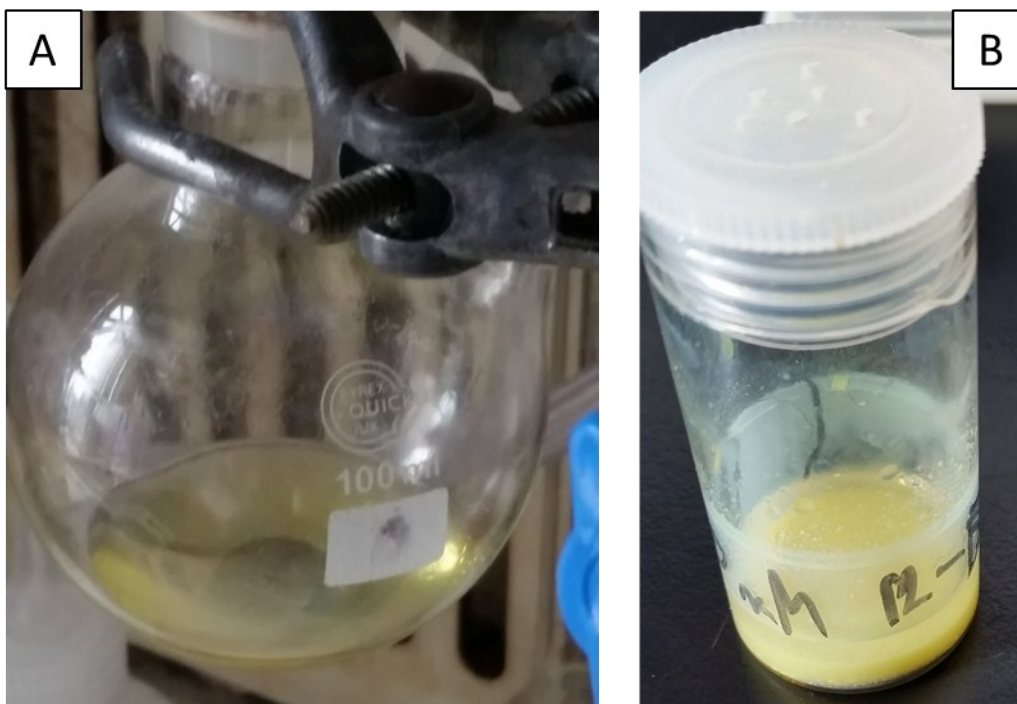
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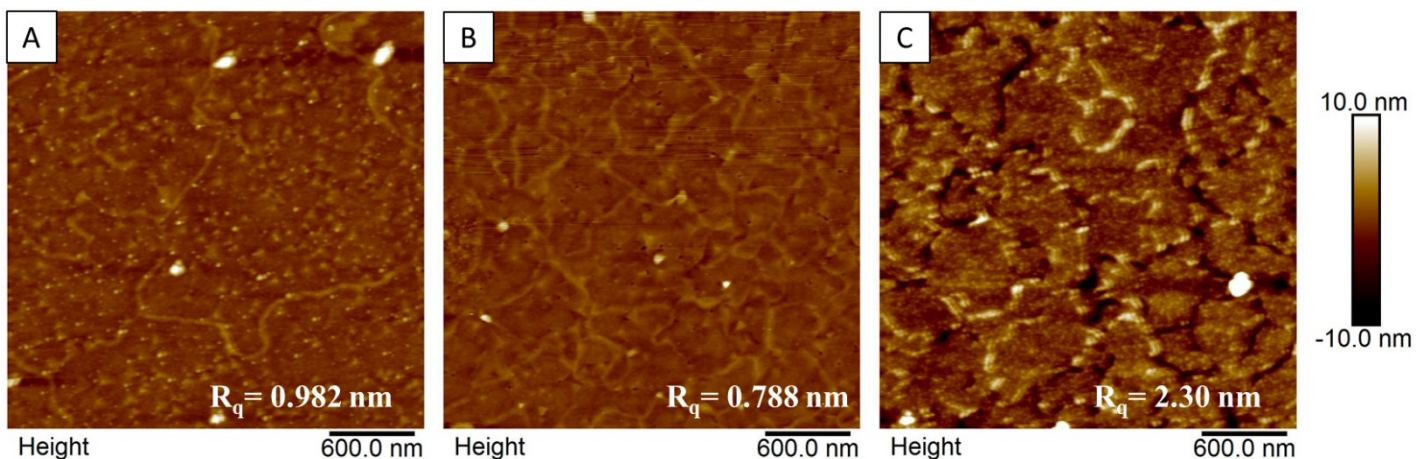
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**Table S1.** Percentages of the elemental Bi and Bi-X components for the Bi *4f* core level XPS scans acquired on the samples

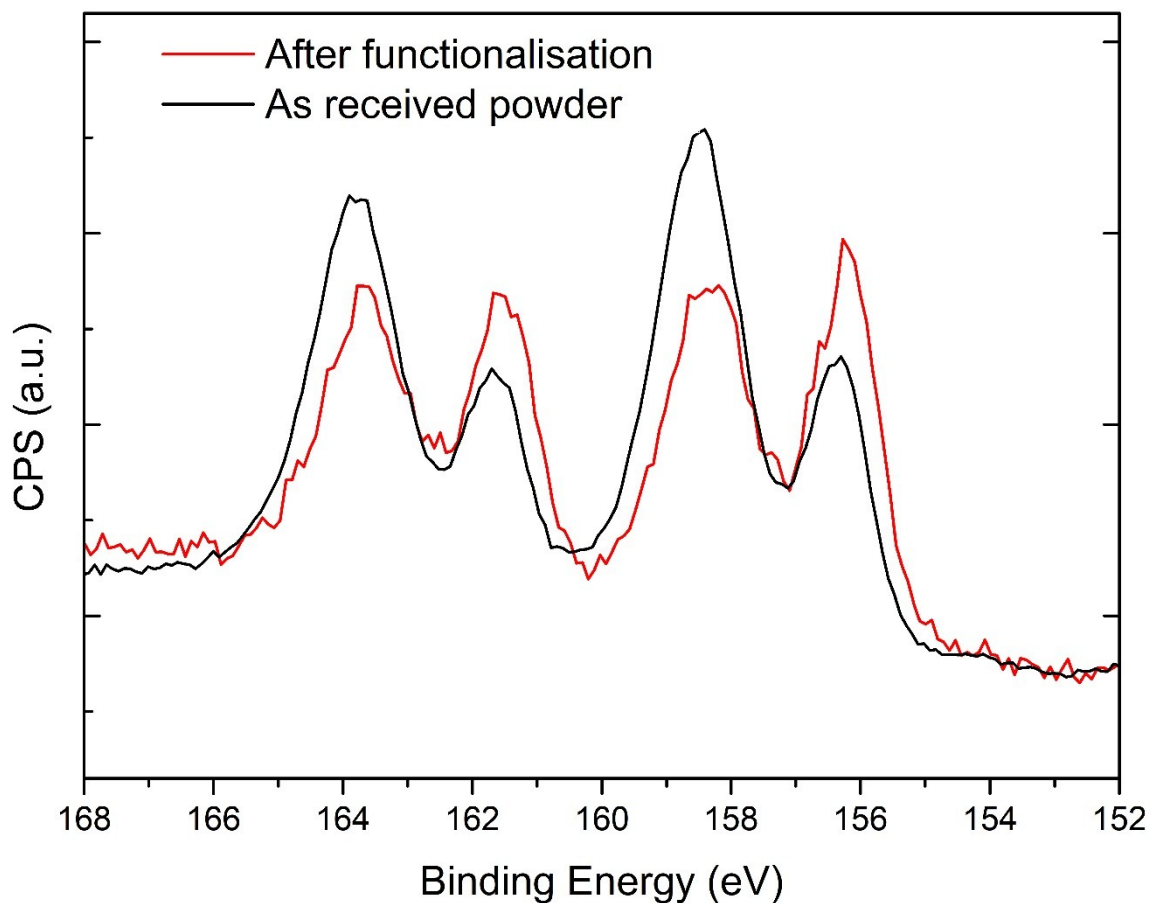
Sample	Bi <i>4f</i> <sub>5/2</sub>	Bi <i>4f</i> <sub>7/2</sub>	BiX <i>4f</i> <sub>5/2</sub>	BiX <i>4f</i> <sub>7/2</sub>
Wafer as rec.	23.5		76.5	
Wafer + 1 mM thiol solution	28.0		72.0	
Wafer + 10 mM thiol solution	59.1		40.9	
Wafer + 100 mM thiol solution	64.9		35.1	
Wafer + 100 mM thiol + air exp.	57.5		42.5	
Powder as rec.	23.5		76.5	
Powder + 100 mM	45.6		54.4	



**Figure S1.** Pictures of (a) Flask under  $N_2$  containing powder and a 100 mM solution of 1-dodecanethiol in IPA and (b) vial in air containing powder and 100 mM solution of 1-dodecanethiol in IPA. Note in both cases the colour of the solution turning yellow.



**Figure S2.** AFM images and RMS roughness values of (a) as received Bi film on Si, (b) Bi film after annealing at 180 °C for 3 hours, (c) annealed Bi surface after functionalisation with 1-dodecanethiol. Note in image (c) the non-continuity of the film which causes some areas of the wafer to reoxidise.



**Figure S3.** Overlaid XPS spectra of Bi *4f* core level of Bi powder before and after reaction with 1-dodecanethiol solution in IPA at 100 mM concentration. Graphs have been normalised to the minimum of the as received sample to underline the oxide reduction effect.