Supplementary Information (SI) for Materials Advances.

The Effect of Solvent on the Functional Properties of Zinc Oxide Film Via AACVD

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^{1}H NMR was used to probe the coordination behaviour of zinc acetate dihydrate in the various solvent mixtures. The following data shows when a dual solvent mixture has been added to zinc acetate dihydrate in the correct 2:1 ratio as used during the depositions. NMR's have also been collected for just the dual solvent mixture to compare changes in environment if coordination takes place with the zinc centre.

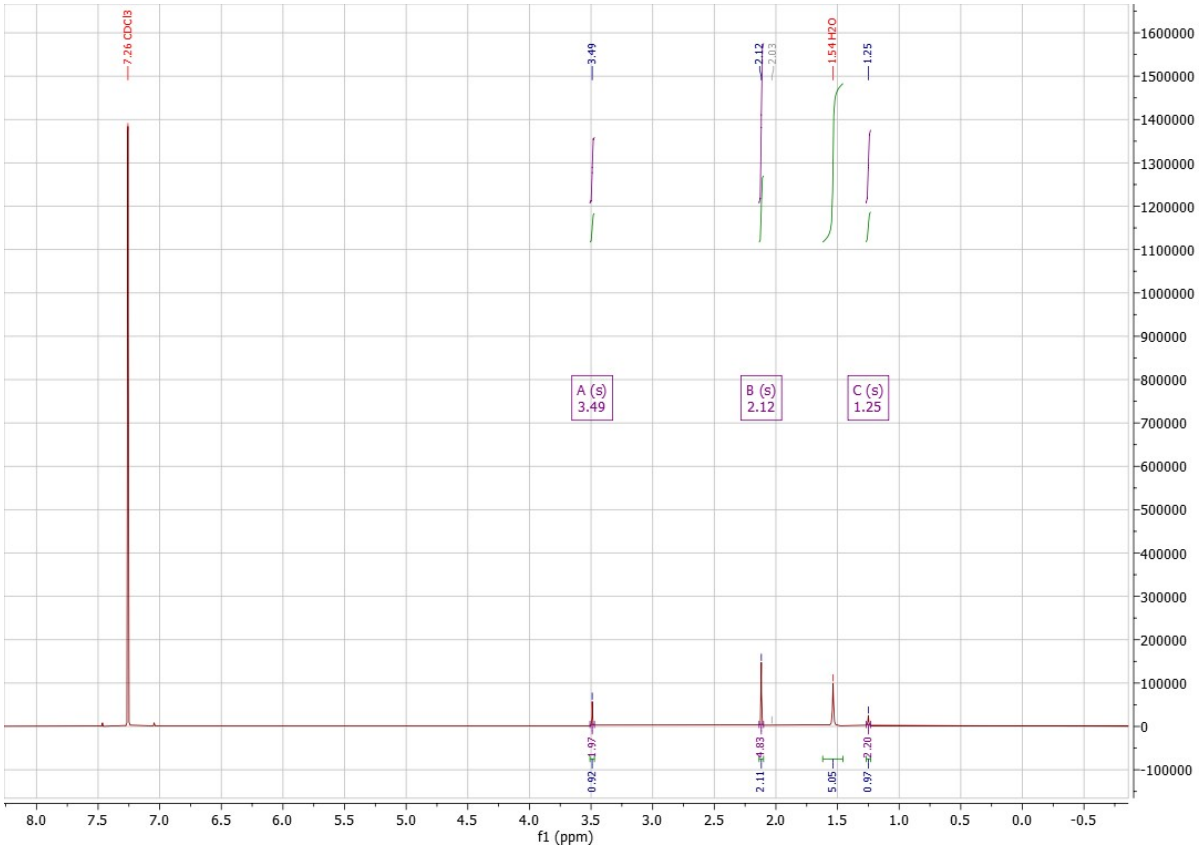


Figure S1: NMR of the zinc acetate dihydrate precursor using $CDCl_3$.

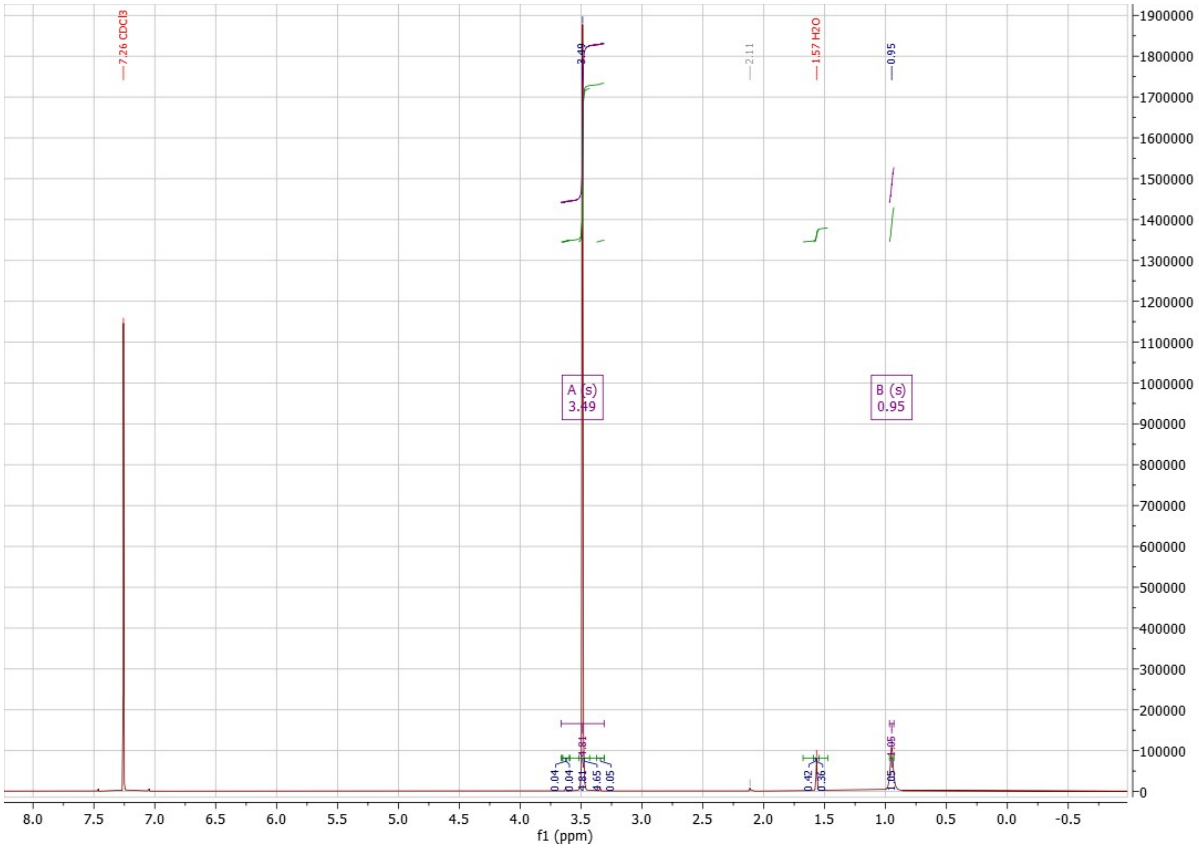


Figure S2: ^{1}H NMR of zinc acetate dihydrate in methanol.

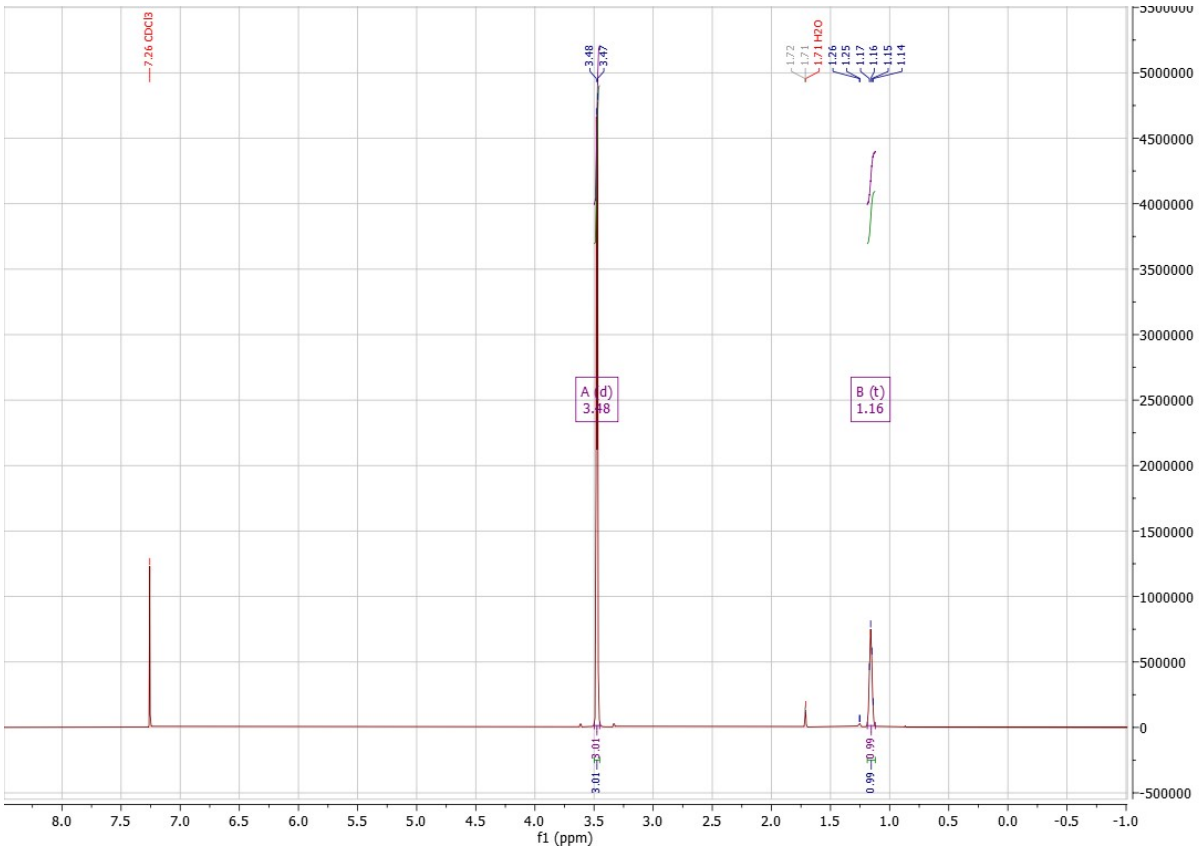


Figure S3: ^{1}H NMR of methanol.

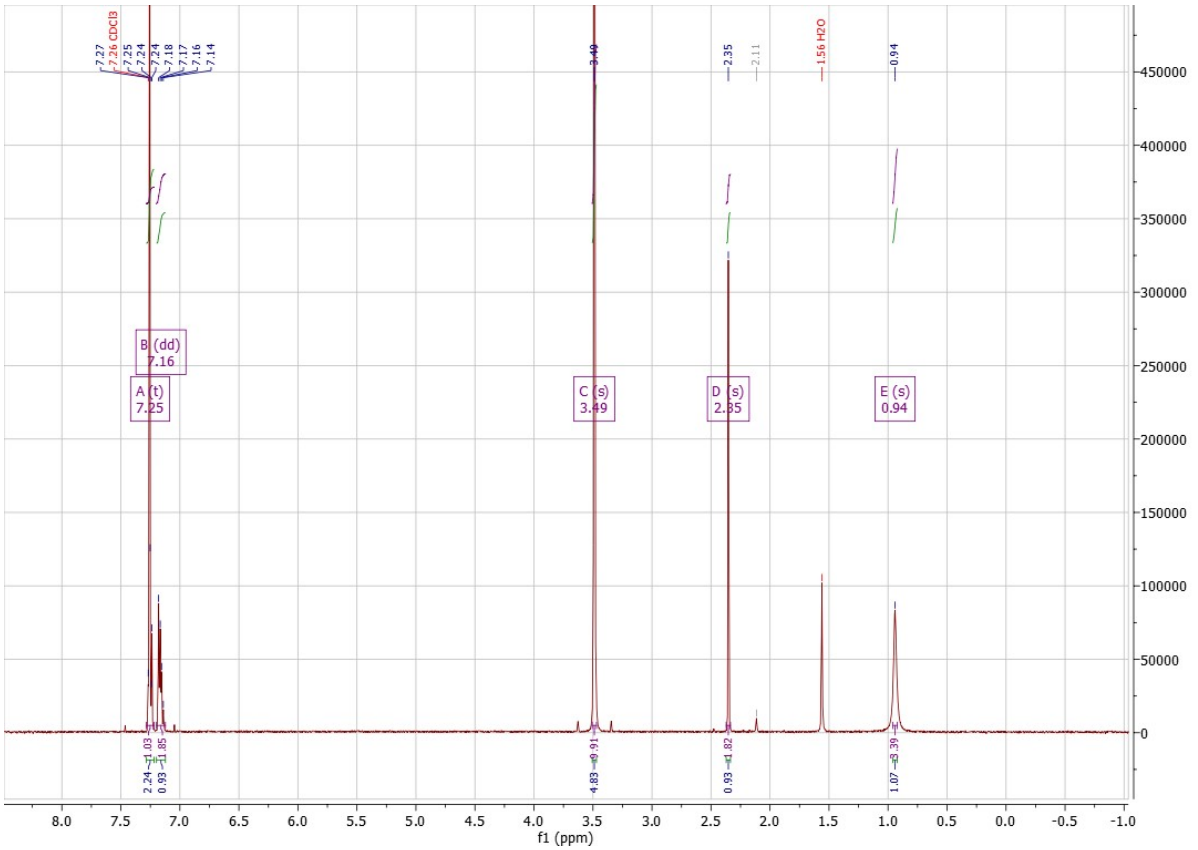


Figure S4: ^{1}H NMR of zinc acetate dihydrate in methanol and toluene.

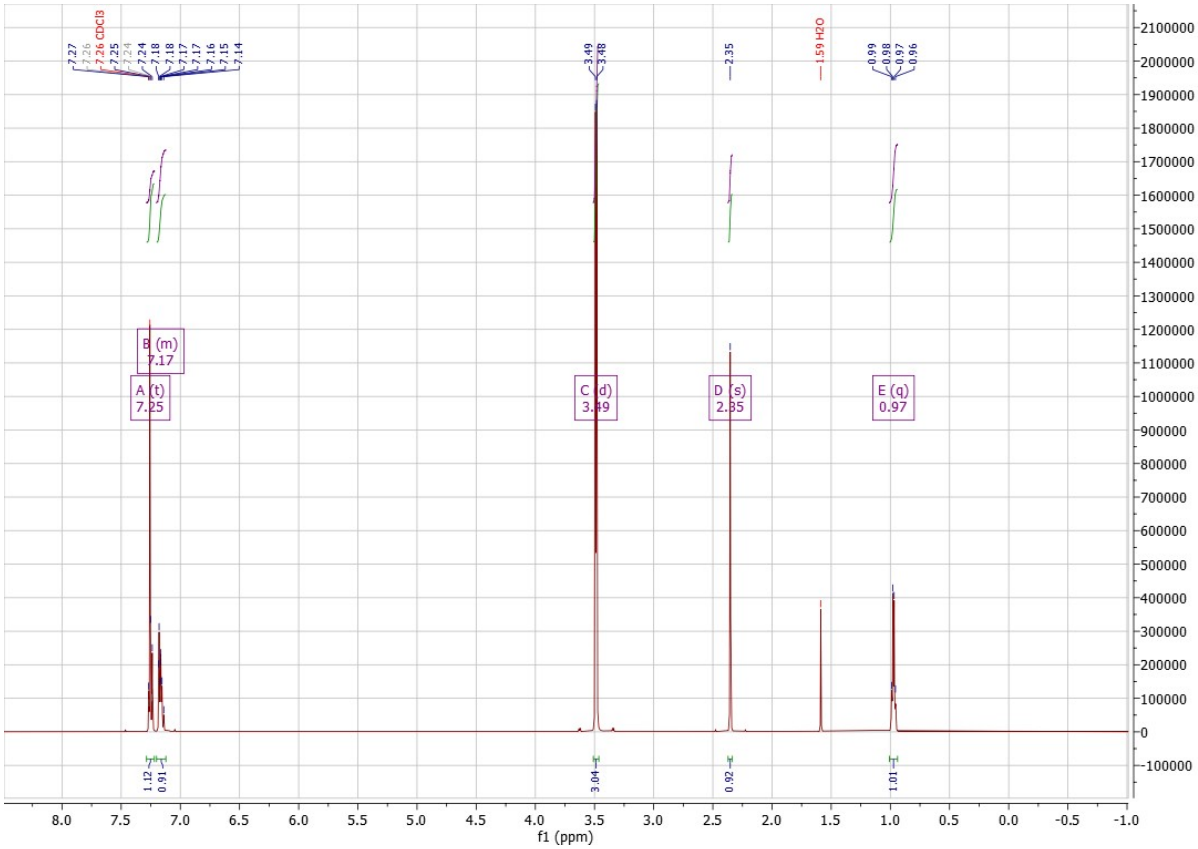
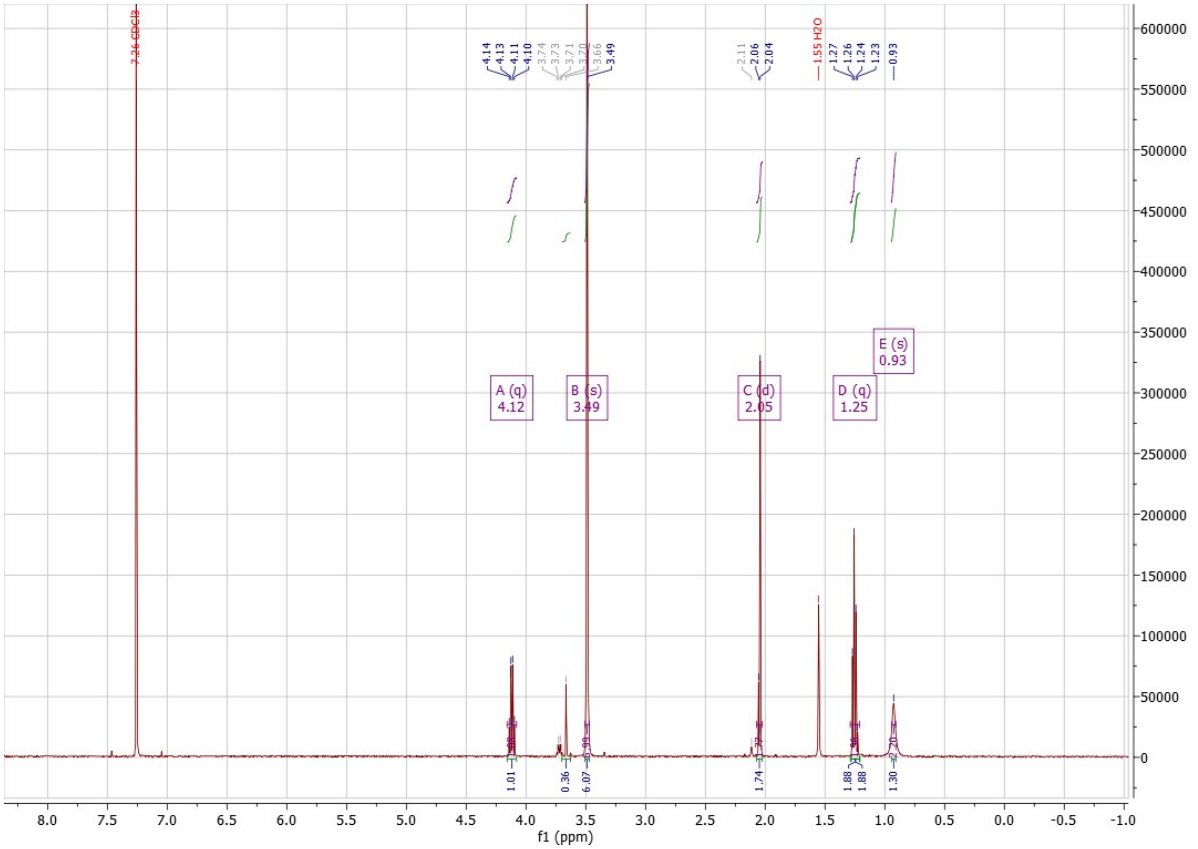


Figure S5: ^{1}H NMR of a methanol and toluene soliution.



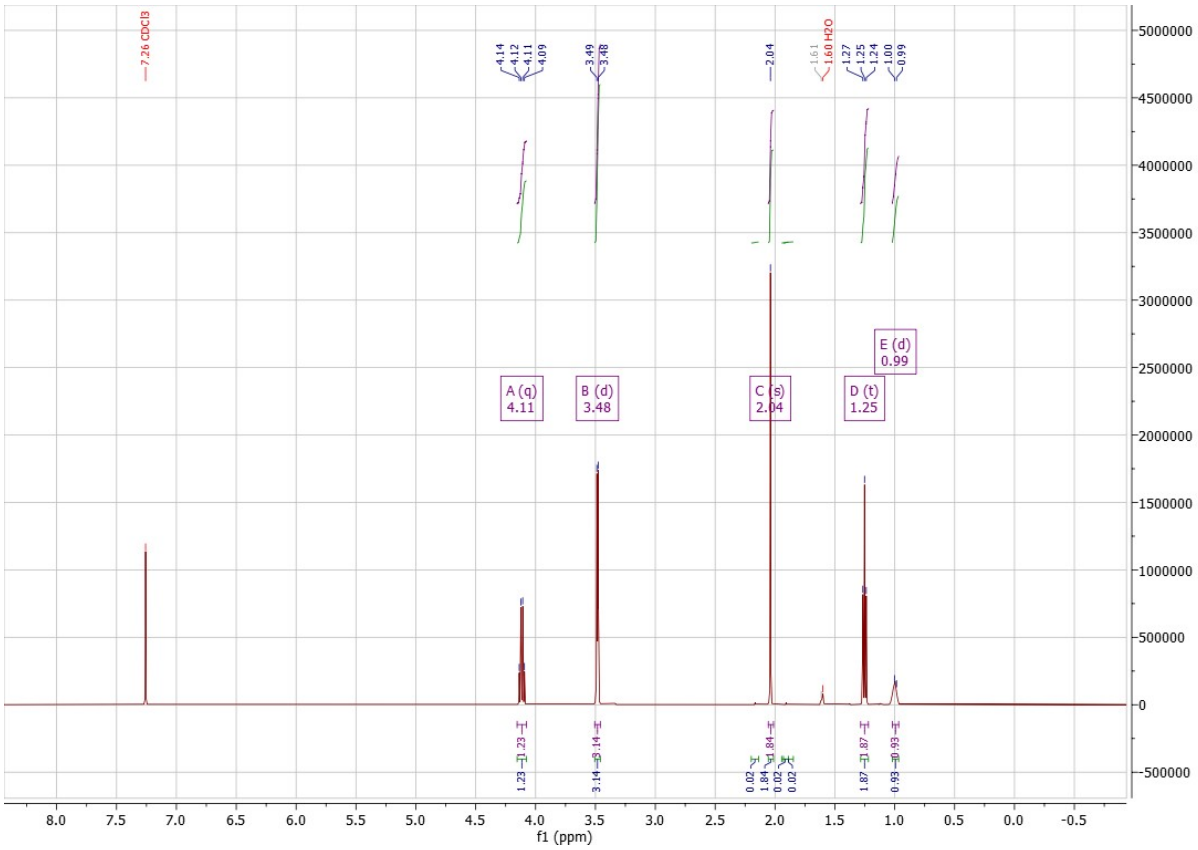


Figure S6: ^{1}H NMR of zinc acetate dihydrate in methanol and ethyl acetate.

Figure S7: ^{1}H NMR of a methanol and ethyl acetate solution.

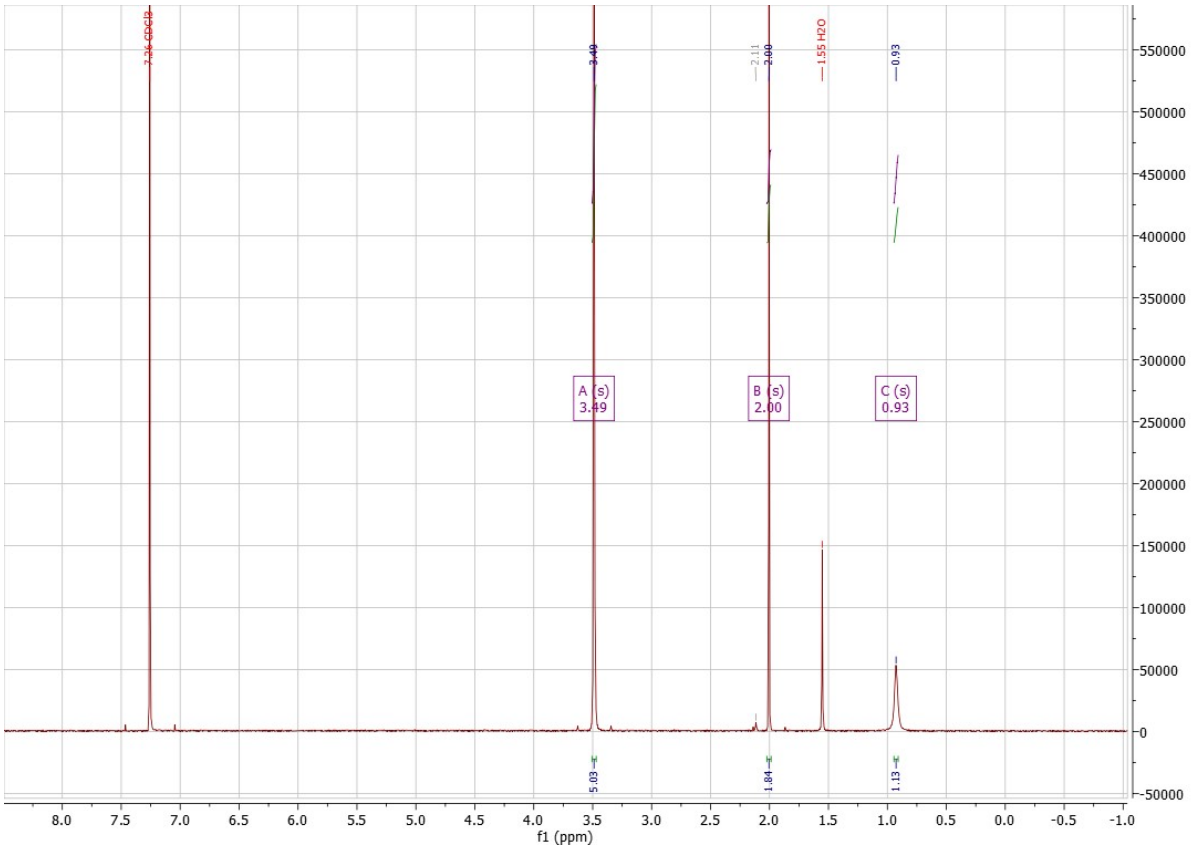


Figure S8: ^{1}H NMR of zinc acetate dihydrate in methanol and acetonitrile.

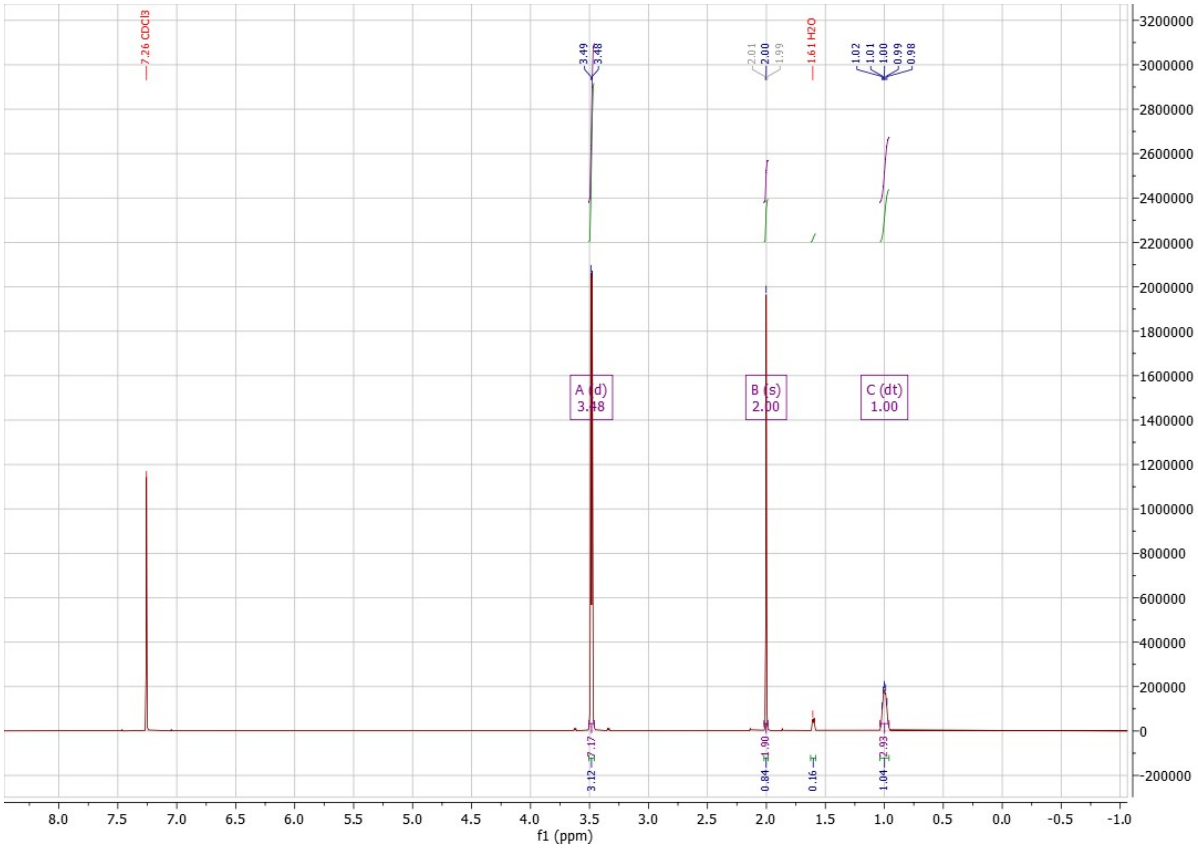


Figure S9: ^{1}H NMR of a methanol and acetonitrile solution.

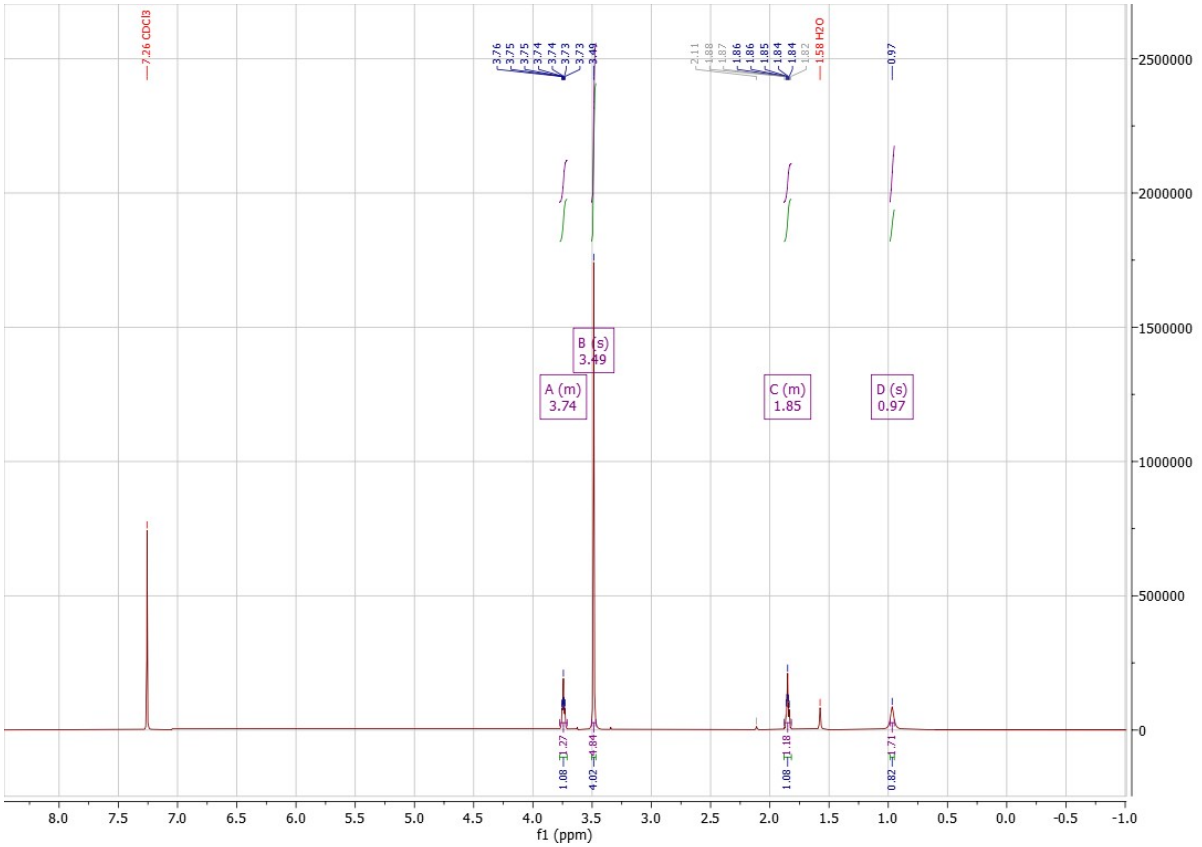


Figure S10: ^{1}H NMR of zinc acetate dihydrate in methanol and THF.

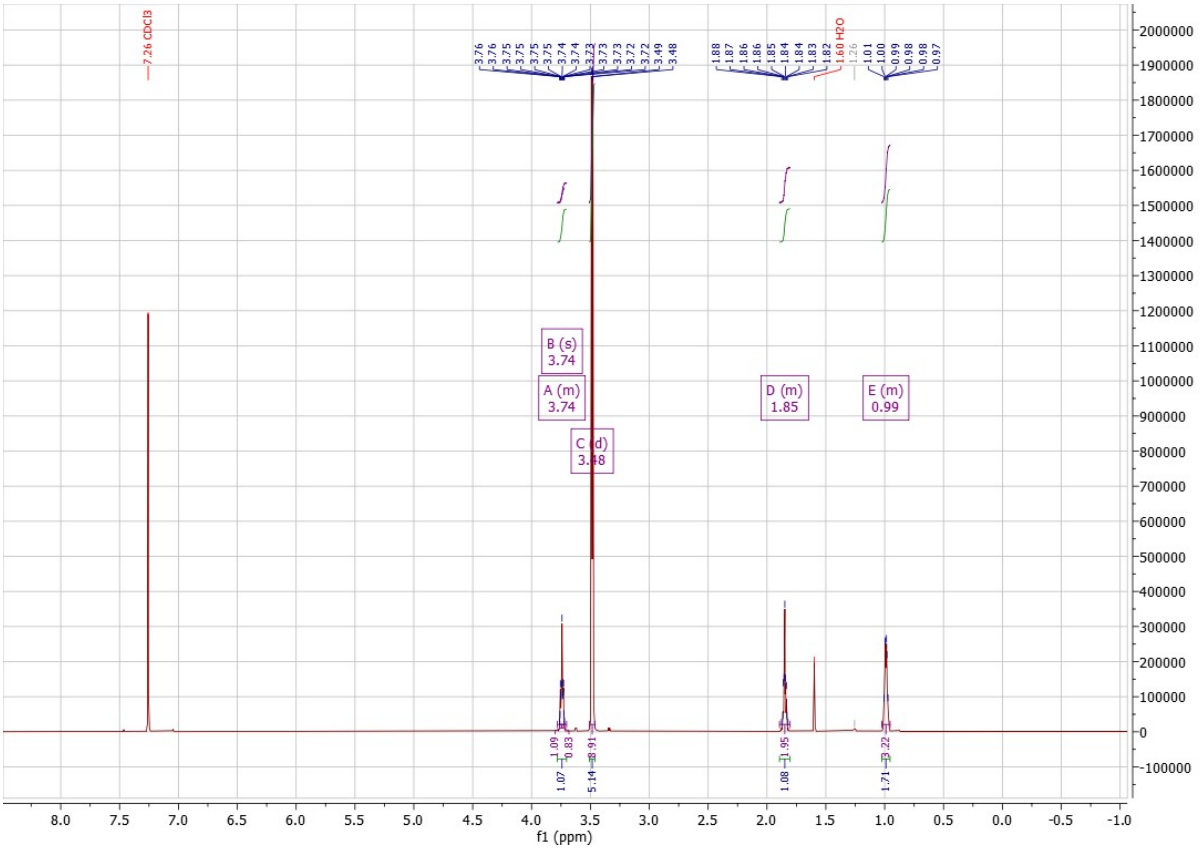


Figure S11: ^{1}H NMR of a methanol and THF solution.

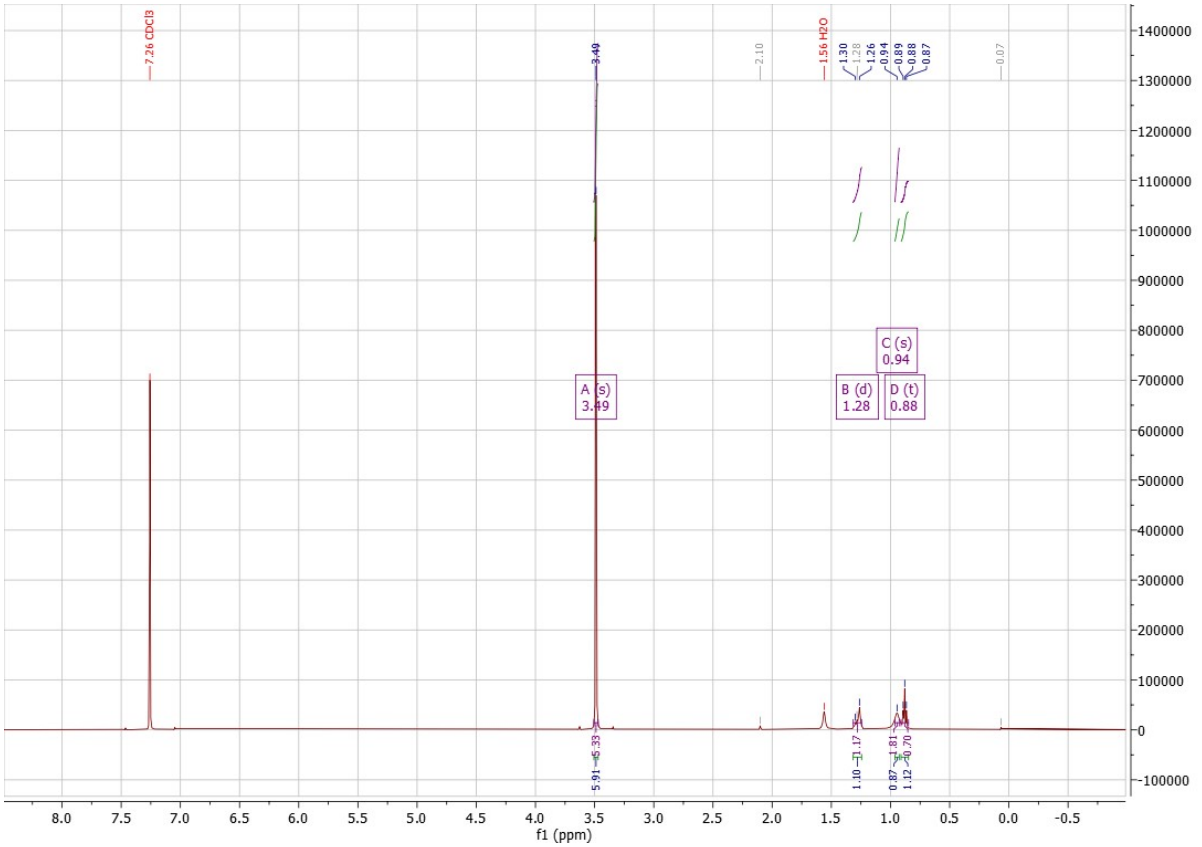


Figure S12: ^{1}H NMR of zinc acetate dihydrate in methanol and hexane.

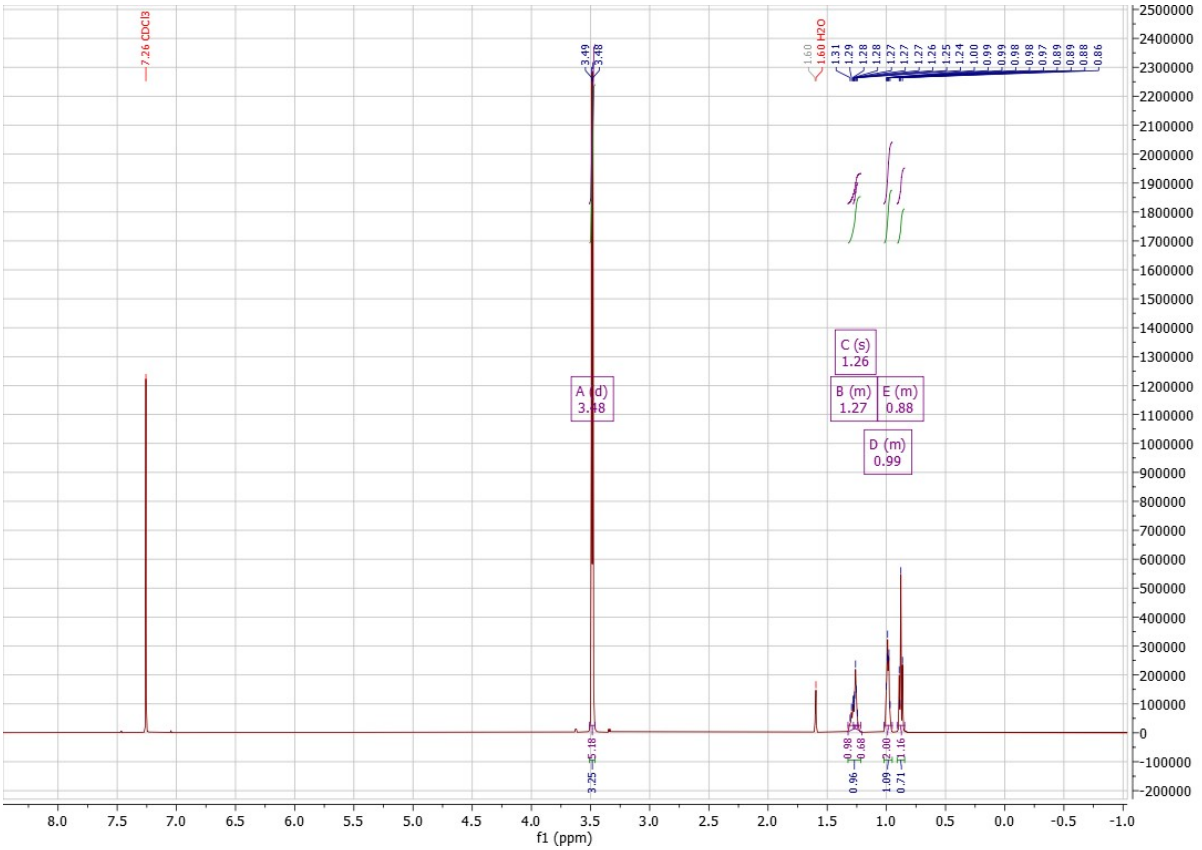


Figure S13: ^{1}H NMR of a methanol and hexane solution.

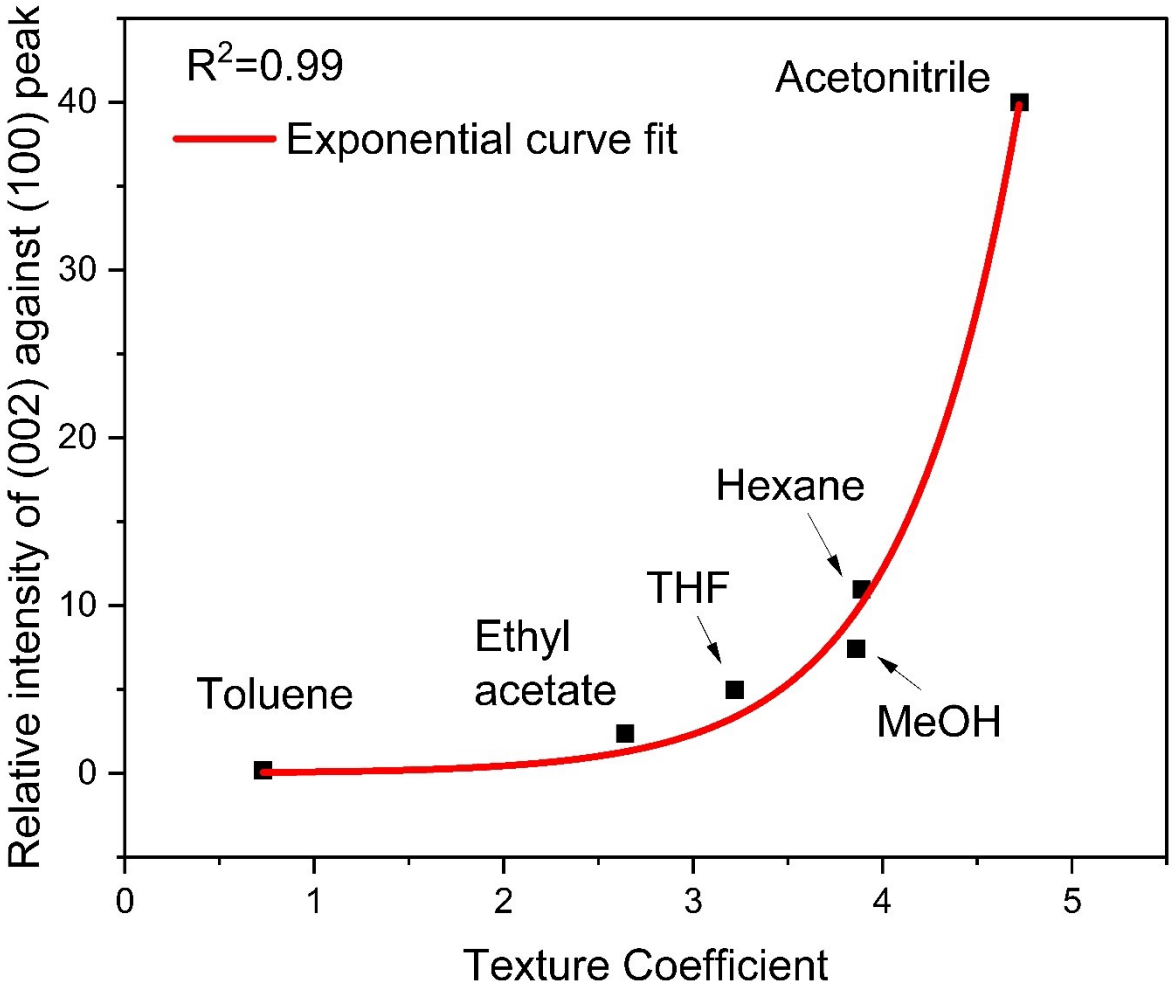


Figure S14: The Texture coefficient of each dual solvent mixture is plotted against the relative intensity of the (002) against the (100) crystal planes. The exponential model has the equation in the form of y=exp(a+bx) and has a regression value of 0.99.

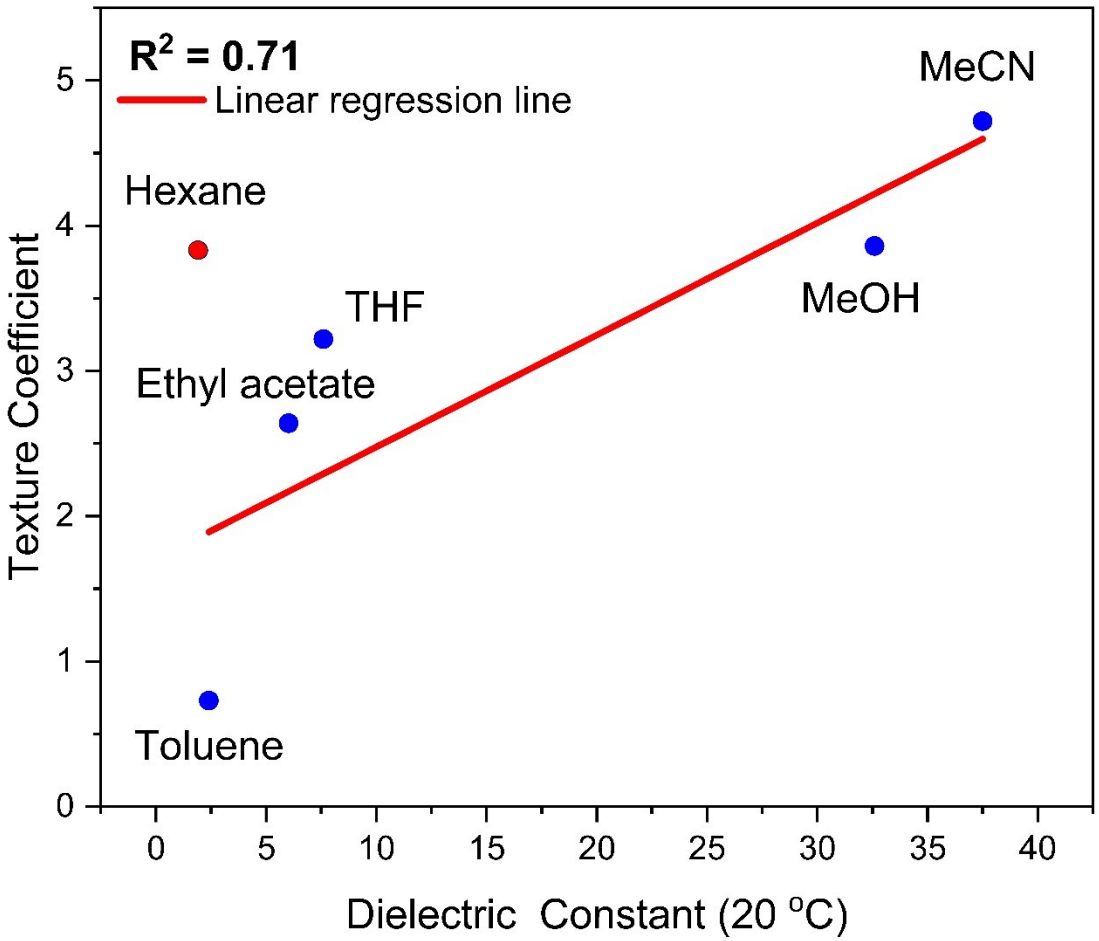


Figure S15: The dielectric constant of the co-solvent has been plotted against the texture coefficient to show if preferential orientation is related to the dielectric constant. A linear fit has been presented with a regression value of 0.71. The hexane point in red has been omitted in this calculation due to reasons mentioned in the main report.

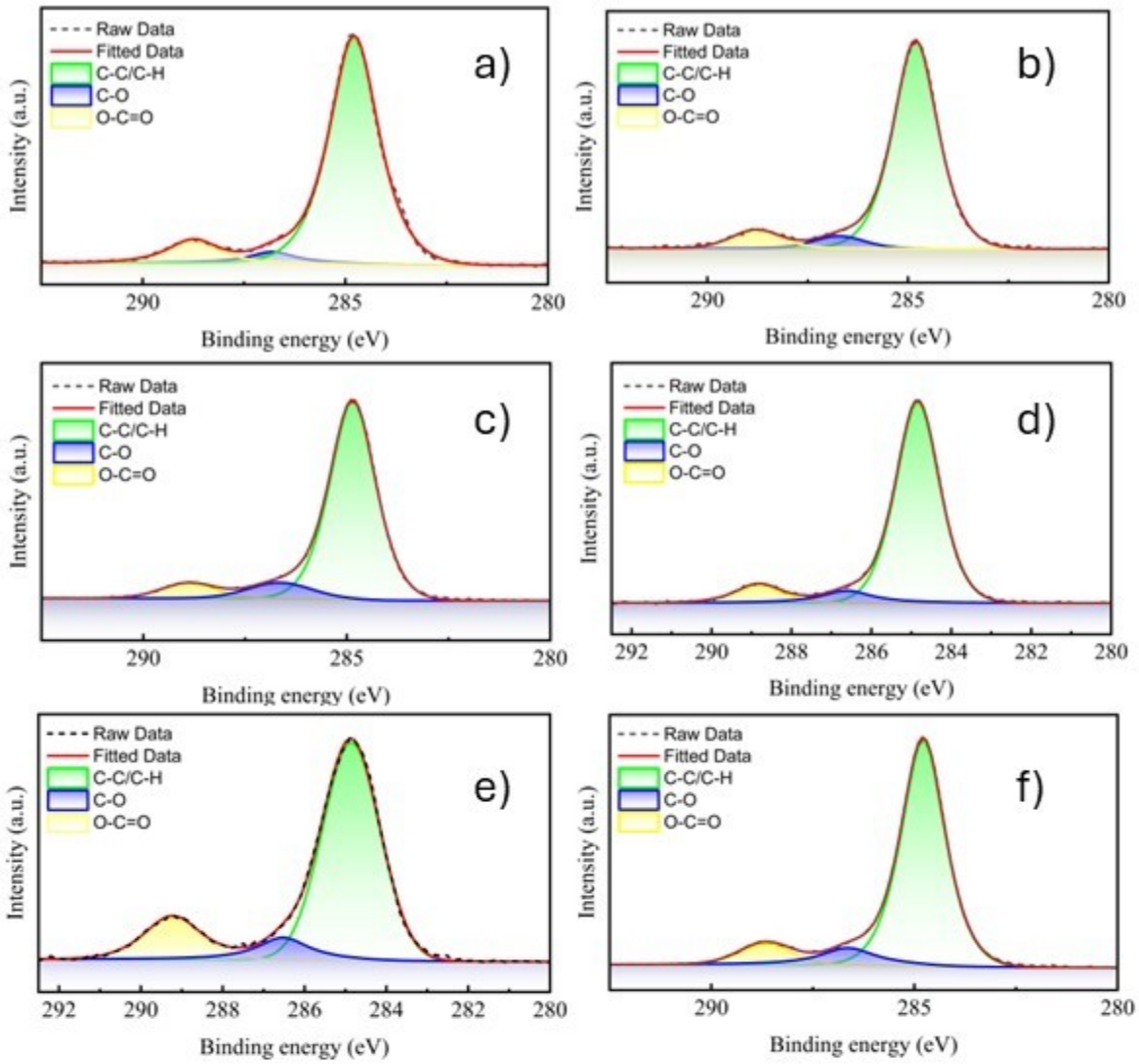


Figure S16: XPS carbon 1s plots show adventitious carbon on the surface of the ZnO films. All films show the presence of the same carbonaceous species as indicated by the legend. a) Methanol, b) Methanol:toluene, c) Methanol:hexane, d) Methanol:THF, e) Methanol:ethyl acetate, f) Methanol:acetonitrile.

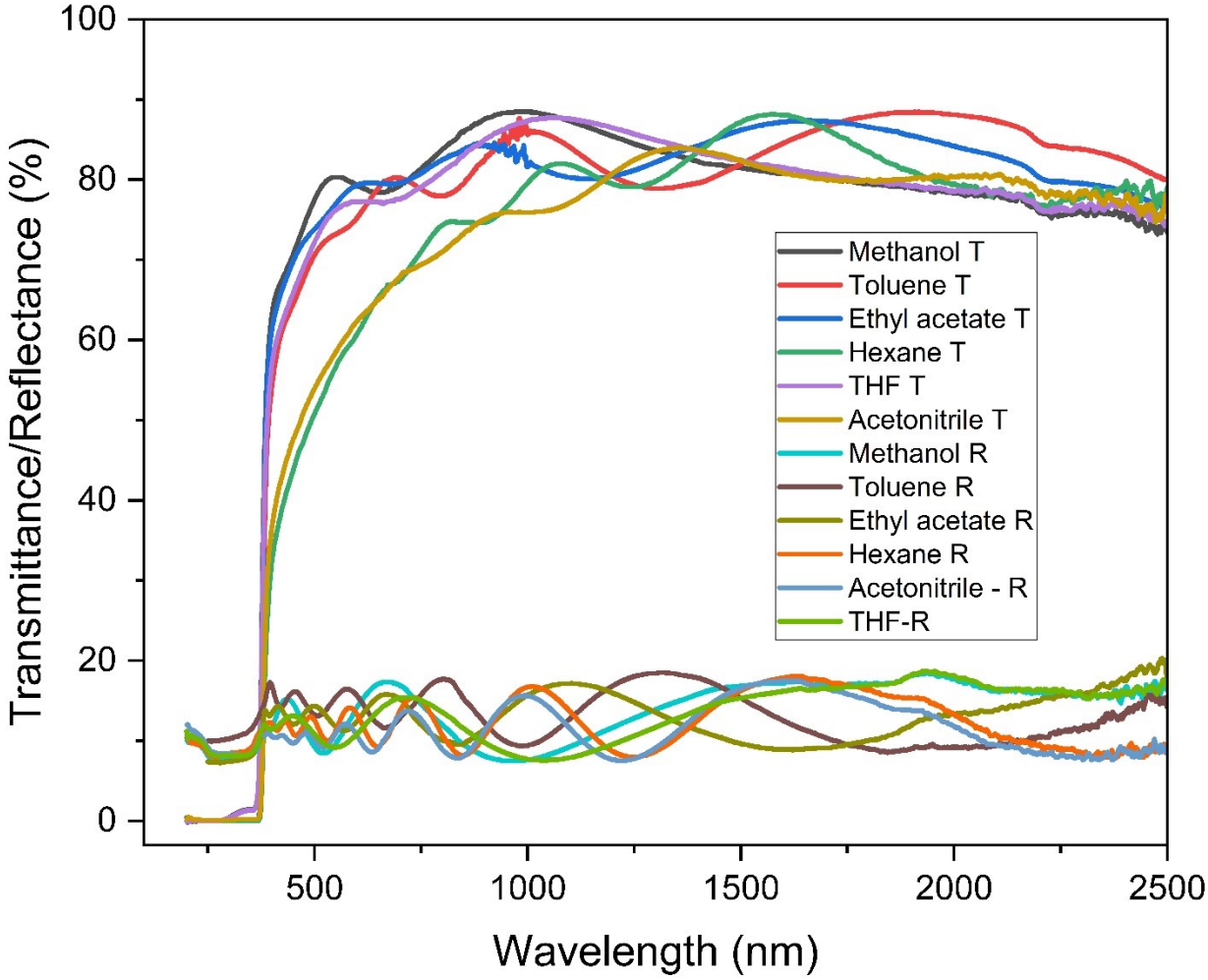


Figure S17: UV-Vis plot of the transmittance (T) and reflectivity (R) of zinc oxide thin films using various solvent mixtures. The co-solvent for each mixture is indicated by the legend.

Figure S18: This table shows the binding energy (eV) and the full width half maximum (FWHM) of each O1s peak for all the solvent systems studied shown in figure **9** in the main report.

	O 1s Peak 1		O 1s Peak 2 (eV)		O 1s Peak 3 (eV)	
Solvent System	Binding energy (eV)	FWHM	Binding energy (eV)	FWHM	Binding energy (eV)	FWHM
Methanol	529.99	1.21	531.60	1.54	532.63	1.65
Methanol:toluene	530.16	1.29	531.37	1.70	532.68	1.70
Methanol:hexane	529.80	1.27	531.67	1.64	533.84	1.38
Methanol:THF	529.95	1.22	531.72	1.70	532.91	1.80
Methanol:ethyl acetate	529.74	1.28	531.72	1.78	533.93	1.54
Methanol:acetonitrile	530.11	1.17	531.66	1.80	533.27	1.62

Acknowledgements

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