Electronic Supplementary Material (ESI) for Analytical Methods.

Electronic supplementary information for

Colorimetric Detection of Water Contents in Organic Solvent via Smartphone with Fluorescent Ag Nanoclusters

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Supporting materials

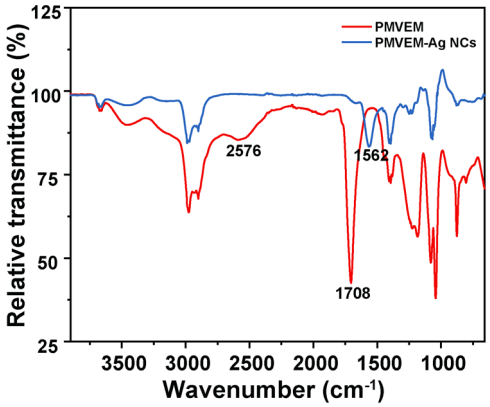

Fig. S1. Infrared spectra of PMVEM and PMVEM-Ag NCs.

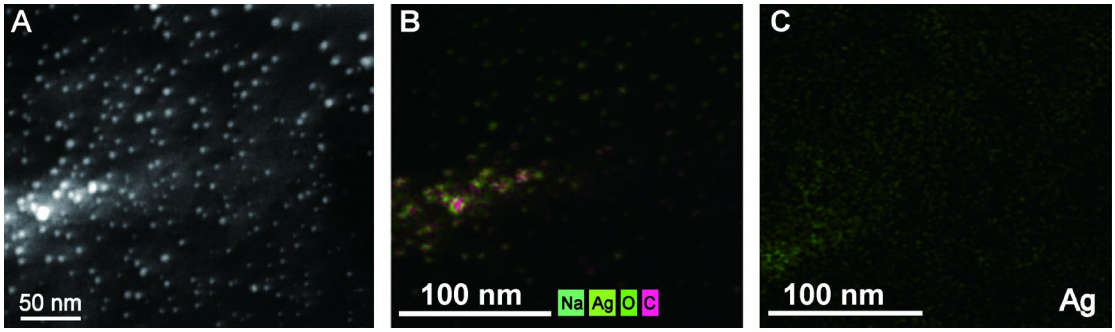

Fig. S2. (A) High-angle annular dark-field scanning transmission electron microscopy (HAADF-STEM) image of PMVEM-Ag NCs. (B) The corresponding elemental mapping of PMVEM-Ag NCs. (C) The elemental mapping of Ag in PMVEM-Ag NCs.

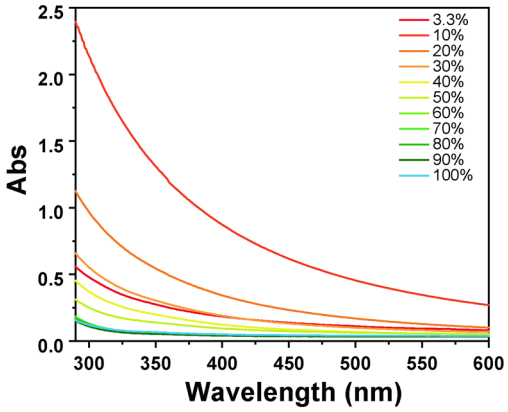

Fig. S3. The UV-Vis absorption spectra of Ag NCs in ethanol with different water contents from 3.3% to 100%. The Ag NCs were directly added into the ethanol solvent with different water contents.

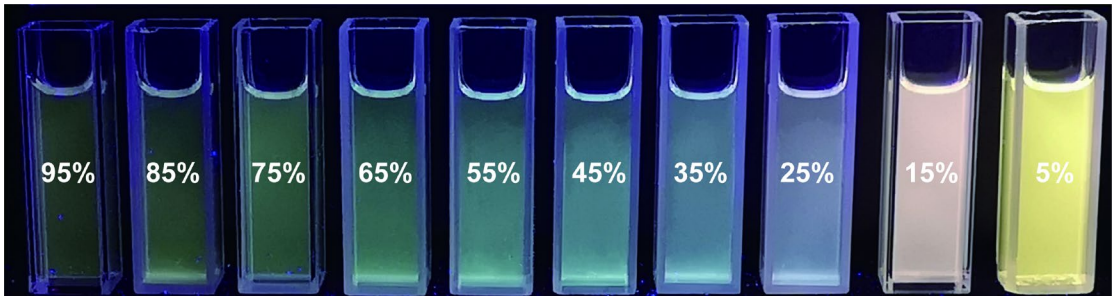

Fig. S4. The picture of samples in ethanol with water contents from 5% to 95% under UV excitation at 365 nm. The Ag NCs were directly added into the ethanol solvent with different water contents.

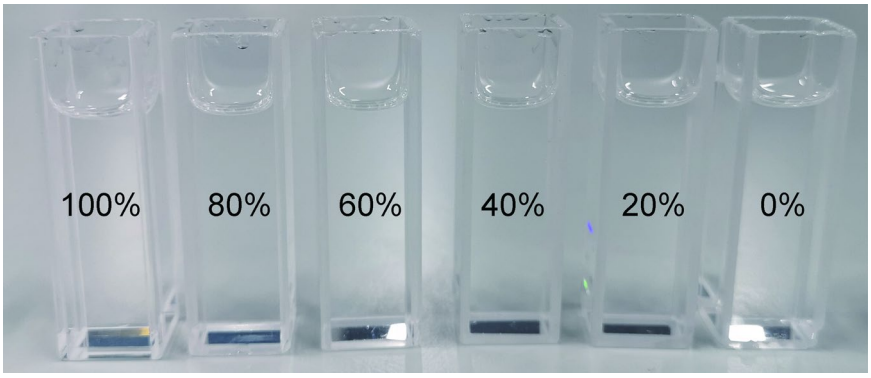

Fig. S5. The colour of PMVEM-Ag NCs in ethanol with different water contents under natural light.

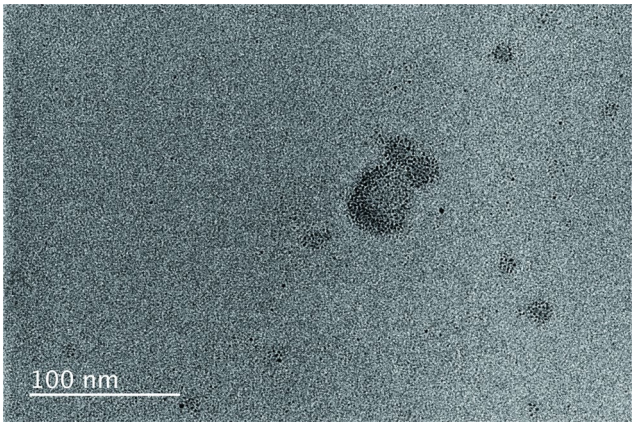

Fig. S6. TEM image of PMVEM-Ag NCs dispersed in DMSO.

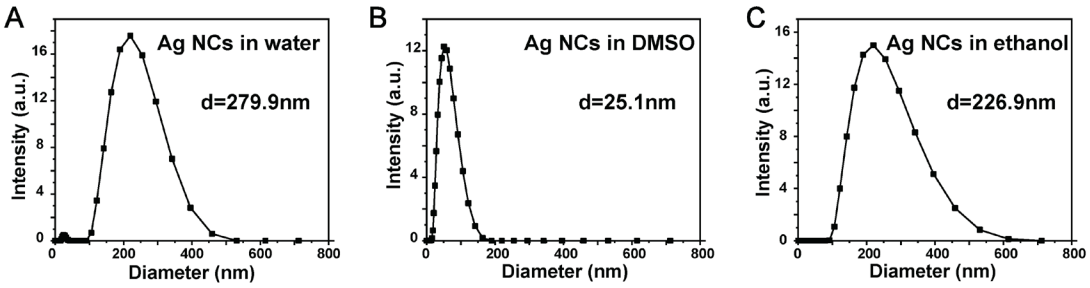

Fig. S7. Dynamic light scattering (DLS) of PMVEM-Ag NCs measured in water (A), DMSO (B) and ethanol (C). The respective hydrodynamic diameter is shown in the figure.

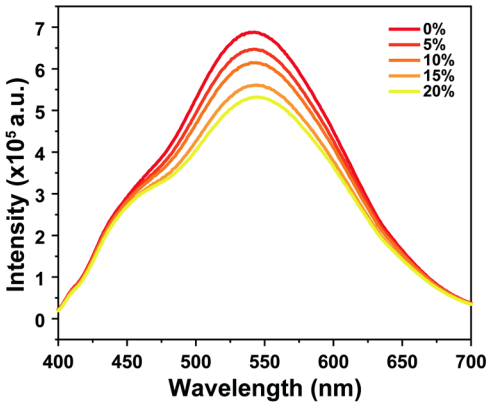

Fig. S8. Emission spectra of PMVEM-Ag NCs in ethanol with the increasing of water contents from 0% to 20%.

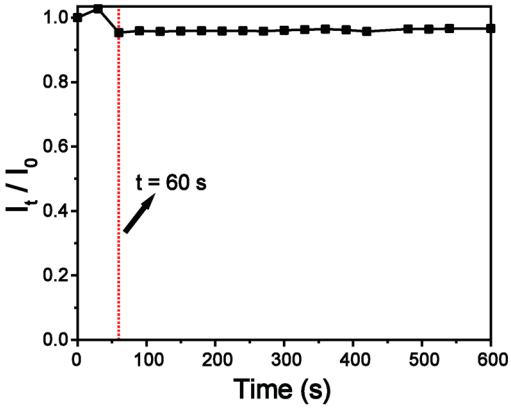

Fig. S9. The response time of PMVEM-Ag NCs in ethanol.

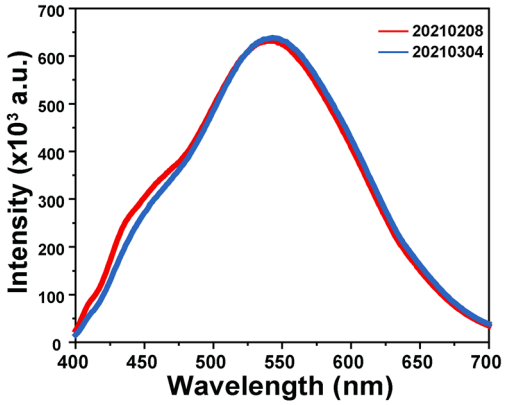

Fig. S10. The fluorescence spectra of PMVEM-Ag NCs dispersed in ethanol with 94% water at different dates (Feb./08/2021 and Mar./04/2021).

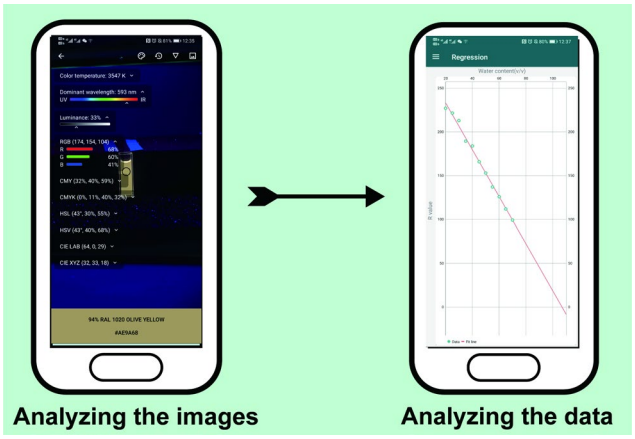

Fig. S11. Schematic illustration of water detection in organic solvents by smartphone through color analysis application (Color Picker) and linear analysis application (Regression).

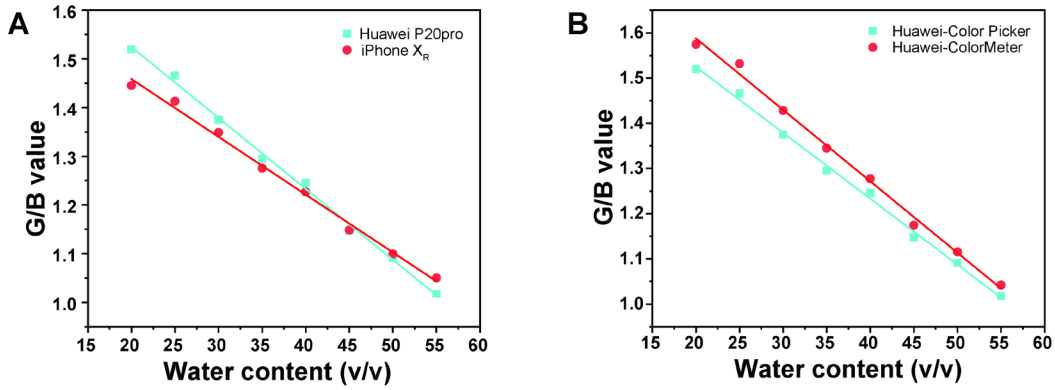

Fig. S12. (A) The linear relationship between G/B value and water contents obtained by Huawei P20pro and iPhone X_R. (B) The linear relationship between G/B value and water contents in the same image analyzed by Color Picker and ColorMeter.

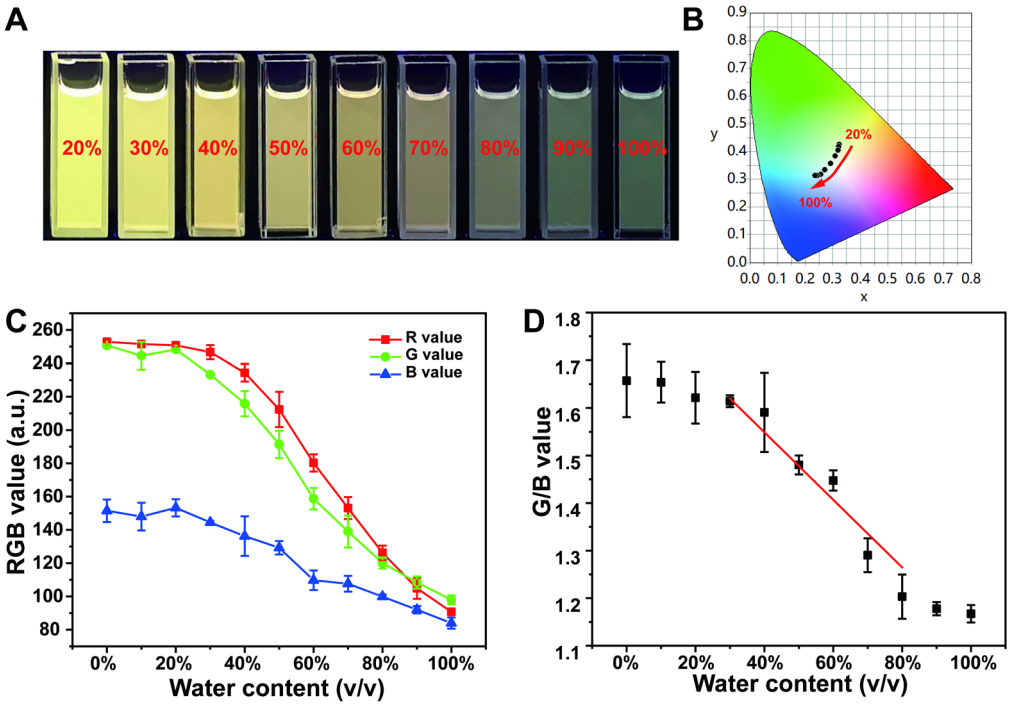

Fig. S13. (A) The picture of sample in DMSO with different water contents under 365 nm UV excitation. (B) CIE diagram displaying the (x, y) color coordinates of samples with different water contents in DMSO. (C) The change of color determined by RGB model in different water contents in DMSO. (D) The linear relationship between the ratio of G value and B value (G/B value) and the water contents in DMSO.

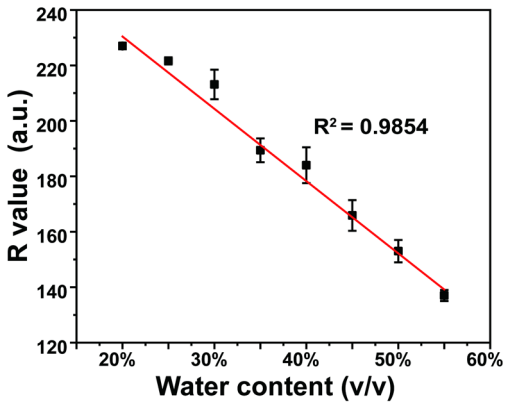

Fig. S14. The linear relationship between R value and water contents in ethanol expressed as $y = -2.6072x + 282.5491$ ($R^2 = 0.9854$) with a detection limit of 1.51%. The water contents were determined to be 25.0% and 27.1% in 65 degrees white wine and 75% medical alcohols.

Table S1. The color data with colorimetric smartphone-based detection of water contents in DMSO.

Color	Water content (%)	R value (a.u.)	G value (a.u.)	B value (a.u.)
	20	**251**	**248**	**153**
	30	**247**	**233**	**144**
	40	**234**	**216**	**136**
	50	**212**	**191**	**130**
	60	**180**	**159**	**110**
	70	**153**	**139**	**108**
	80	**126**	**120**	**100**
	90	**105**	**108**	**92**
	100	**91**	**98**	**84**

Table S2. The color data with colorimetric smartphone-based detection of water contents in ethanol.

Color	Water content (%)	R value (a.u.)	G value (a.u.)	B value (a.u.)
	20	**227**	**206**	**116**
	25	**222**	**195**	**117**
	30	**213**	**182**	**115**
	35	**190**	**166**	**114**
	40	**184**	**160**	**117**
	45	**166**	**143**	**116**
	50	**153**	**137**	**115**
	55	**137**	**129**	**115**

Table S3. Comparison of detection of water in ethanol based on different fluorescence nanomaterials.

Methods/Materials	Limit of detection (LOD)	Linear detection range	Comments	Ref.
CQDs	0.01%	0.01%~10%	Narrow detection range and single-emission	10
RCDs	0.36%	10%~60%	Single-emission	11
Eu-MOFs/N, S-CDs	0.03%	0.05%~4%	Narrow detection range	24
CDs-CuNCs	0.95%	2.5%~45%	Low accuracy	28
PMVEM-Ag NCs	4.48%	20%~55%	Intrinsically dual-emission and broad detection range	This work