Supplementary material

The refractive index of common solvents and solutions at 1550 nm

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1. Densities of aqueous solutions

The density of the solutions were obtained from polynomial fits to values as given in the literature.

$$\rho = Aw^5 + Bw^4 + Cw^3 + Dw^2 + Ew + F \qquad (1)$$

The references and the fit parameters are listed in Table S1

Table S1: Fit parameters for density functions

	A	*B*	*C*	*D*	*E*	*F*	Ref
Sucrose*	0	0	0.0263	0.1476	0.3826	0.9984	[1]
NaCl	0	0	0	0.2385	0.6940	0.9971	[2]
DMSO	0.6703	-1.6403	1.2350	-0.3359	0.1669	0.9966	[3]
Ethylene glycol	0	0.0256	-0.0933	0.0613	0.1194	0.9971	[4]
Glycerol	0	0	-0.0385	0.0726	0.2265	0.9973	[5]

* The sucrose densities were obtained at 20^{0}C . All others were obtained at 25^{0}C

(1) United States Department of Agriculture (USDA), Sucrose Conversion Table, FILE CODE 135-A-50, January 1981
(2) Gates, J. A.; Wood, R. H.: Densities of aqueous solutions of sodium chloride, magnesium chloride, potassium chloride, sodium bromide, lithium chloride, and calcium chloride from 0.05 to 5.0 mol kg-1 and 0.1013 to 40 MPa at 298.15 K. Journal of Chemical & Engineering Data **1985**, 30, 44-49.
(3) LeBel, R. G.; Goring, D. A. I.: Density, Viscosity, Refractive Index, and Hygroscopicity of Mixtures of Water and Dimethyl Sulfoxide. Journal of Chemical & Engineering Data **1962**, 7, 100-101.
(4) Sakurai, M.: Partial molar volumes of ethylene glycol and water in their mixtures. Journal of Chemical & Engineering Data **1991**, 36, 424-427.
(5) Physical properties of glycerine and its solutions; Glycerol Producers' Association: New York, 1963.

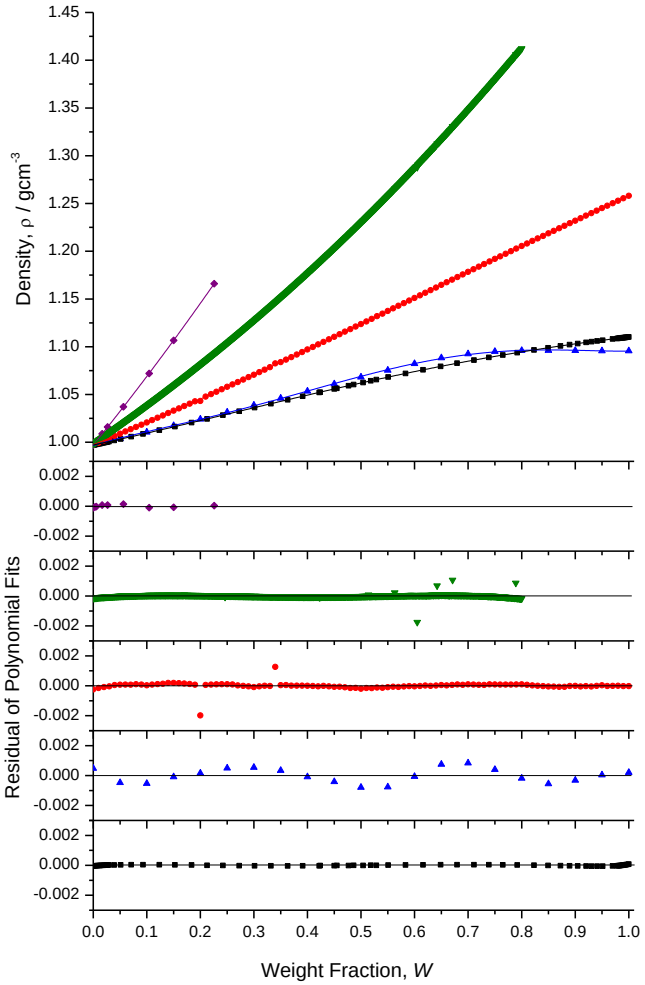

Figure S1: Densities of aquesous solutions of NaCl (magenta), Sucrose (green), glycerol (red), DMSO (blue), and ethylene glycol (black). The densities are fit to polynomial functions of 3rd, 4th and 5th order with parameters listed in Table S1.

2. Solvent suppliers and purity

Table S2: Solvent suppliers and purity

Solvent	Grade	Purity	Supplier
De-ionized Water	Protocol De-ionized Water (100% v/v)	> 10 MΩ	Thermo Fisher Scientific
Methanol	HPLC Grade	99.9 %	Fisher Scientific
Acetonitrile	HPLC Grade	99.97 %	Fisher Scientific
Acetone	ACS Reagent Grade	> 99.5 %	ACP Chemicals
100% Ethanol	Anhydrous	> 99%	Commercial Alcohols
95% Ethanol	95% Ethanol 5% Water	> 95%	Commercial Alcohols
Formaldehyde Solution		37.38% w/w Formaldehyde 10-15% Methanol as Stabilizer 48-53% Water	Sigma Aldrich
Iso-propyl Alchol (2 – Propanol)	ACS Reagent Grade	> 99.5 %	ACP Chemicals
Hexanes (Mixture of C_6H_{14} Isomers)	ACS Reagent Grade	> 98.5 %	ACP Chemicals
1-Propanol	Anhydrous	99.7 %	Sigma Aldrich
2-Butanol		> 99 %	Sigma Aldrich
Tetrahydrofuran	Certified (Contains 0.025% Butylatedhydroxytolu ene as stabilizer)	> 95%	Fisher Scientific
1,4 Dioxane	Certified ACS Grade	99.9 %	Fisher Scientific
Dichloromethane	ACS Reagent Grade	≥ 99.5 %	ACP Chemicals
Cyclohexane	Puriss, ACS Reagent	≥ 99.5 %	Sigma Aldrich
N,N Dimethylformamide	Certified ACS Grade	99.9 %	Fisher Scientific
Ethylene Glycol	Reagent Plus	≥ 99 %	Sigma Aldrich
N,N DimethylAcetamide	OmniSolv	99.5%	BDH
Chloroform	ACS Reagent Grade	> 99.8% (0.75% Ethanol as Stabilizer)	Fisher Scientific
Glycerol	Reagent Plus	≥ 99.0 %	Sigma Aldrich
Trichloroethylene	ACS Reagent Grade	> 99.5 %	Sigma Aldrich
Dimethylsulfoxide	Certified ACS Grade	99.9 %	Fisher Scientific
Ethylbenzne	Reagent Plus	99 %	Sigma Aldrich
Toluene	ChromaSolv Plus for HPLC	≥ 99.9 %	Sigma Aldrich
m-Xylene	Puriss	≥ 99.0 %	Sigma Aldrich
o-Xylene	Reagent Grade	≥ 98.0 %	Sigma Aldrich
p-Xylene	Reagent Plus	99 %	Sigma Aldrich
Xylenes (Mixture of 3 isomers) 4% EthylBenzene	Certified ACS	99.8 %	Fisher Scientific
Benzene	ChromaSolv Plus for HPLC	≥ 99.9%	Sigma Aldrich

3. Measured refractive indices at 1550 nm

Table S3: Refractive indices of NaCl-water solutions

Mass fraction, W%	Mole fraction, *x*	*n* (1550 nm) at 298K
0.0000	0.0000	1.3164(2)
0.0025	0.0008	1.3165(4)
0.0052	0.0016	1.3169(3)
0.0078	0.0024	1.3173(3)
0.0099	0.0031	1.3177(4)
0.0124	0.0039	1.3183(1)
0.0150	0.0047	1.3185(3)
0.0175	0.0055	1.3192(1)
0.0198	0.0062	1.3196(1)
0.0251	0.0079	1.3203(4)
0.0301	0.0095	1.3211(1)
0.0354	0.0112	1.3218(2)
0.0401	0.0127	1.3227(1)
0.0454	0.0144	1.3236(1)
0.0502	0.0160	1.3244(2)
0.0600	0.0193	1.3260(2)
0.0700	0.0227	1.3277(2)
0.0800	0.0261	1.3301(9)
0.0896	0.0295	1.3314(1)
0.0999	0.0331	1.3329(2)
0.1095	0.0365	1.3347(1)
0.1198	0.0403	1.3366(1)
0.1300	0.0441	1.3382(3)
0.1398	0.0477	1.3401(1)
0.1498	0.0515	1.3416(3)
0.1585	0.0549	1.3434(3)
0.1681	0.0586	1.3451(1)
0.1787	0.0629	1.3470(1)
0.1899	0.0674	1.3489(1)
0.1987	0.0710	1.3509(6)
0.2098	0.0756	1.3528(3)
0.2202	0.0801	1.3546(4)
0.2380	0.0878	1.3578(3)
0.2401	0.0887	1.3582(3)
0.2504	0.0933	1.3601(5)

Table S4: Refractive indices of sucrose-water solutions

Mass fraction, W%	Mole fraction, *x*	*n* (1550 nm) at 298K
0.0000	0.0000	1.3164(2)
0.0029	0.0002	1.3169(1)
0.0053	0.0003	1.3174(1)
0.0077	0.0004	1.3177(1)
0.0100	0.0005	1.3188(1)
0.0154	0.0008	1.3179(1)
0.0195	0.0010	1.3193(2)
0.0297	0.0016	1.3209(1)
0.0398	0.0022	1.3224(2)
0.0498	0.0028	1.3239(1)
0.0599	0.0033	1.3251(2)
0.0797	0.0045	1.3282(3)
0.1016	0.0059	1.3317(4)
0.1211	0.0072	1.3344(2)
0.1401	0.0085	1.3372(1)
0.1595	0.0099	1.3405(1)
0.1781	0.0113	1.3439(3)
0.1976	0.0128	1.3466(1)
0.2196	0.0146	1.3501(2)
0.2387	0.0162	1.3534(4)
0.2589	0.0181	1.3569(3)
0.2797	0.0200	1.3605(4)
0.2996	0.0220	1.3639(3)
0.3188	0.0240	1.3672(4)
0.3400	0.0264	1.3707(4)
0.3601	0.0288	1.3748(6)
0.3797	0.0312	1.3787(4)
0.4007	0.0340	1.3825(1)
0.4196	0.0366	1.3866(4)
0.4408	0.0398	1.3904(2)
0.4608	0.0430	1.3945(2)
0.4803	0.0464	1.3992(10)
0.5003	0.0501	1.4032(11)
0.5206	0.0541	1.4075(12)
0.5407	0.0583	1.4126(8)
0.5585	0.0624	1.4164(10)
0.5795	0.0676	1.4210(6)
0.6006	0.0733	1.4261(9)
0.6186	0.0786	1.4295(6)
0.6393	0.0853	1.4342(7)
0.6599	0.0927	1.4389(4)
0.6795	0.1004	1.4436(8)
0.6990	0.1089	1.4488(3)
0.7002	0.1095	1.4489(7)
0.7201	0.1193	1.4540(8)
0.7405	0.1306	1.4589(2)
0.7584	0.1418	1.4637(3)
0.7798	0.1571	1.4701(11)
0.7994	0.1734	1.4781(12)

Table S5: Refractive indices of DMSO-water solutions

Mass fraction, W%	Mole fraction, *x*	*n* (1550 nm) at 298K
0.0000	0.0000	1.3164(2)
0.0250	0.0059	1.3199(1)
0.0488	0.0117	1.3233(1)
0.0740	0.0181	1.3269(1)
0.1006	0.0251	1.3301(1)
0.1249	0.0319	1.3336(1)
0.1505	0.0392	1.3374(1)
0.1761	0.0470	1.3412(2)
0.2002	0.0546	1.3449(1)
0.2235	0.0622	1.3481(1)
0.2482	0.0708	1.3517(2)
0.2747	0.0803	1.3560(1)
0.2992	0.0896	1.3596(1)
0.3253	0.1000	1.3638(2)
0.3484	0.1097	1.3673(1)
0.3753	0.1217	1.3716(1)
0.3996	0.1331	1.3755(1)
0.4254	0.1458	1.3799(1)
0.4502	0.1588	1.3840(1)
0.4755	0.1729	1.3881(1)
0.5001	0.1874	1.3922(1)
0.5255	0.2034	1.3965(1)
0.5503	0.2200	1.4006(2)
0.5728	0.2362	1.4045(9)
0.5997	0.2568	1.4083(3)
0.6248	0.2774	1.4133(11)
0.6483	0.2983	1.4168(8)
0.6753	0.3241	1.4204(1)
0.7001	0.3499	1.4248(6)
0.7251	0.3782	1.4283(3)
0.7504	0.4094	1.4320(6)
0.7767	0.4450	1.4359(7)
0.8004	0.4804	1.4387(3)
0.8251	0.5210	1.4423(5)
0.8498	0.5662	1.4452(2)
0.8749	0.6172	1.4482(3)
0.9001	0.6750	1.4517(1)
0.9247	0.7391	1.4546(1)
0.9498	0.8135	1.4574(1)
0.9754	0.9015	1.4604(1)
1.0000	1.0000	1.4631(1)

Table S6: Refractive indices of Ethylene glycol-water solutions

Mass fraction, W%	Mole fraction, *x*	*n* (1550 nm) at 298K
0.0000	0.0000	1.3164(2)
0.0241	0.0071	1.3183(5)
0.0458	0.0137	1.3210(6)
0.0727	0.0222	1.3237(9)
0.1004	0.0314	1.3266(3)
0.1239	0.0394	1.3282(10)
0.1495	0.0485	1.3307(7)
0.1757	0.0583	1.3338(5)
0.1984	0.0670	1.3356(9)
0.2258	0.0780	1.3387(8)
0.2507	0.0885	1.3416(3)
0.2741	0.0988	1.3426(12)
0.3004	0.1108	1.3465(7)
0.3249	0.1226	1.3487(8)
0.3498	0.1350	1.3509(6)
0.3755	0.1486	1.3539(9)
0.3989	0.1615	1.3566(6)
0.4258	0.1771	1.3597(3)
0.4507	0.1923	1.3623(3)
0.4747	0.2078	1.3647(5)
0.4999	0.2249	1.3672(7)
0.5264	0.2439	1.3699(5)
0.5499	0.2618	1.3725(7)
0.5750	0.2820	1.3755(3)
0.5996	0.3030	1.3781(1)
0.6260	0.3270	1.3809(1)
0.6505	0.3508	1.3833(3)
0.6749	0.3760	1.3857(2)
0.7002	0.4040	1.3884(1)
0.7261	0.4349	1.3912(1)
0.7504	0.4659	1.3935(1)
0.7766	0.5023	1.3963(2)
0.8007	0.5383	1.3987(1)
0.8250	0.5778	1.4010(2)
0.8520	0.6255	1.4034(2)
0.8753	0.6708	1.4056(3)
0.8995	0.7220	1.4082(1)
0.9251	0.7820	1.4107(2)
0.9501	0.8467	1.4131(3)
0.9750	0.9188	1.4152(1)
1.0000	1.0000	1.4174(2)

Table S7: Refractive indices of glycerol-water solutions

Mass fraction, W%	Mole fraction, *x*	*n* (1550 nm) at 298K
0.0000	0.0000	1.3164(2)
0.0239	0.0048	1.3188(3)
0.0491	0.0100	1.3222(4)
0.0747	0.0156	1.3251(6)
0.0968	0.0205	1.3275(4)
0.1284	0.0280	1.3317(2)
0.1504	0.0335	1.3342(3)
0.1757	0.0400	1.3378(1)
0.1983	0.0462	1.3407(5)
0.2231	0.0532	1.3437(6)
0.2525	0.0620	1.3475(3)
0.2748	0.0690	1.3505(4)
0.2993	0.0771	1.3540(4)
0.3284	0.0873	1.3576(3)
0.3503	0.0954	1.3607(2)
0.3764	0.1056	1.3642(3)
0.4002	0.1155	1.3674(4)
0.4288	0.1281	1.3717(1)
0.4495	0.1377	1.3749(1)
0.4739	0.1498	1.3783(1)
0.5017	0.1646	1.3821(1)
0.5279	0.1795	1.3862(1)
0.5447	0.1897	1.3886(1)
0.5766	0.2104	1.3933(1)
0.5982	0.2255	1.3967(4)
0.6262	0.2468	1.4007(4)
0.6521	0.2683	1.4045(5)
0.6757	0.2896	1.4076(6)
0.6992	0.3126	1.4115(7)
0.7153	0.3296	1.4154(5)
0.7516	0.3719	1.4193(7)
0.7768	0.4051	1.4232(5)
0.7996	0.4383	1.4271(4)
0.8278	0.4847	1.4316(4)
0.8538	0.5332	1.4354(7)
0.8795	0.5880	1.4394(5)
0.9021	0.6431	1.4429(4)
0.9288	0.7185	1.4465(4)
0.9505	0.7899	1.4496(4)
0.9749	0.8839	1.4529(1)
1.0000	1.0000	1.4569(1)