

Supplementary Information

Magnetic deep eutectic solvents: formation and properties

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1. Experiment Section

Density model expression

For all prepared MDESs, the density values decrease linearly with temperature in the whole measured temperature range and thus could be expressed by the following equation (1):

$$\rho = a + bT \quad (1)$$

where ρ (g cm^{-3}) corresponds to density, T is the temperature in $^{\circ}\text{C}$, a and b are the fitting parameters.

Viscosity model expression

The experimental viscosity values of MDESs were fitted as a function of temperature by using the Vogel-Fulcher-Tammann (VFT) model:

$$\ln \eta = A + \frac{B}{T - T_0} \quad (2)$$

where η (mPa s) is the viscosity, T ($^{\circ}\text{C}$) is the temperature, A , B and T_0 are adjustable parameters.

2. Supplementary Figures and Discussion

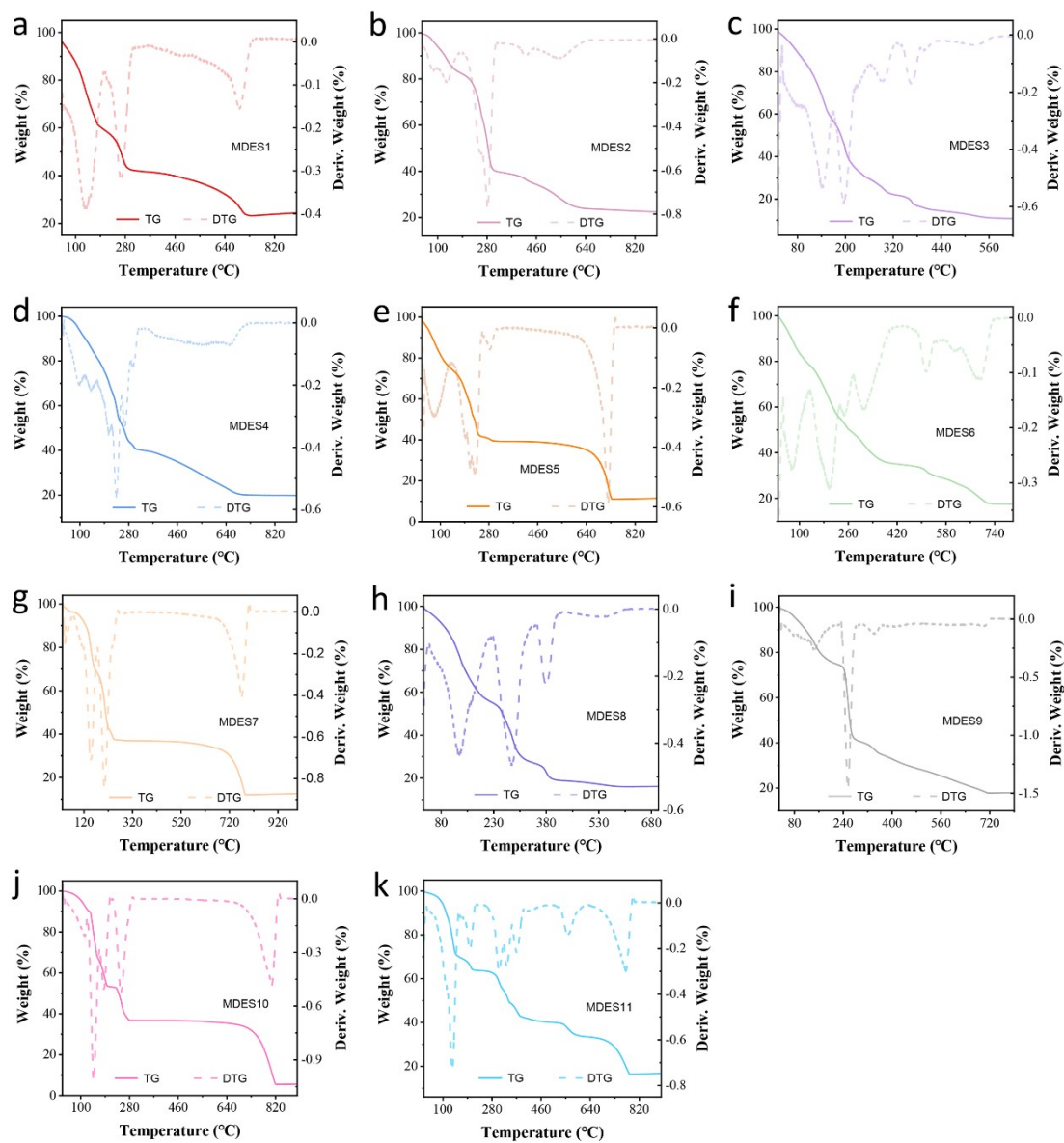


Figure S1. TG and DTG curves of MDESs.

3. Table

Table S1. The onset temperatures (T_{onset}) and maximum decomposition temperatures of MDESs.

	$T_{\text{onset}}/^{\circ}\text{C}$	$T_{\text{max}}/^{\circ}\text{C}$
MDES1	71.6	136.7
MDES2	66.2	281.6
MDES3	72.8	141.4
MDES4	79.2	234.6
MDES5	73.1	227.6
MDES6	71.8	199.2
MDES7	89.7	205.3
MDES8	66.3	133.4
MDES9	71.8	255.8
MDES10	75.3	148.2
MDES11	74.6	134.7

Table S2. Physicochemical properties (conductivity, Kamlet–Taft Parameters and pH) of MDES9 with different molar ratio at 25 °C.

Components (molar ratio)	σ ($\mu\text{S cm}^{-1}$)	α	β	π^*	pH
$\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$: Glycerol (1:1)	2800	1.20	1.01	0.94	2.4
$\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$: Glycerol (1:3)	1370	1.17	0.98	0.92	2.9

Table S3. Parameters a and b of Equation (1) and respective correlation coefficient (R^2), depicting temperature dependence of density of the studied MDESs.

	a (g cm ⁻³)	b (g cm ⁻³ K ⁻¹)	R ²
MDES1	1.481	-9.037×10 ⁻⁴	0.999
MDES2	1.546	-7.003×10 ⁻⁴	0.999
MDES3	1.358	-9.163×10 ⁻⁴	0.999
MDES4	1.510	-8.128×10 ⁻⁴	0.999
MDES5	1.449	-1.080×10 ⁻³	0.999
MDES6	1.559	-1.770×10 ⁻³	0.990
MDES7	1.480	-5.688×10 ⁻⁴	0.999
MDES8	1.367	-7.783×10 ⁻⁴	0.999
MDES9	1.527	-5.666×10 ⁻⁴	0.999
MDES10	1.494	-7.090×10 ⁻⁴	0.999
MDES11	1.666	-2.901×10 ⁻³	0.955

Table S4. Fitted parameters of VFT model given by Equation (2) and respective correlation coefficient (R^2) for prepared MDESs.

	A (mPa s)	B (K)	T_0 (K)	R^2
MDES1	-2.371	700.7	195.2	0.999
MDES2	-6.699	2306.3	154.0	0.999
MDES3	-2.341	695.7	205.2	0.999
MDES4	-2.455	866.5	201.4	0.999
MDES5	-1.988	583.1	209.9	0.999
MDES6	-2.921	755.4	200.9	0.999
MDES7	-2.384	920.0	169.3	0.999
MDES8	-3.199	1026.8	183.2	0.998
MDES9	-3.811	1425.5	171.3	1
MDES10	-3.179	1026.8	199.3	0.999
MDES11	-2.370	852.5	198.9	0.999