Supporting Information (SI)

Thermal Conductivity of Ionic Liquids and IoNanofluids and their Feasibility as Heat Transfer Fluids

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Table S1 - Ionic liquids specifications, purity as mass fraction

Property	$[C_2mim]$ $[SCN]$	$[C_4mim]$ $[SCN]$	$[C_2mim]$ $[C(CN)_3]$	$[C_4mim]$ $[C(CN)_3]$	$[P_{66614}][dca]$	$[P_{66614}][Br]$
Identity (NMR, IR)	pass	pass	pass	pass	pass	Pass
Assay (NMR)	> 98%	> 98%	> 98%	> 98%	> 95%	> 95%
Cation (IC)	99.2%	98.5%	99.3%	99.8%	N/A	N/A
Anion (IC)	99.4%	99.9%	99.4%	99.6%	N/A	N/A
Halides (IC)	< 2%	< 2%	< 0.5%	< 0.5%	N/A	N/A
Water (KF)	1312 ppm	1725 ppm	87 ppm	590 ppm	N/A	N/A
Appearance	Yellow to brown liquid	Yellow to orange liquid	Yellow to brown liquid	Yellow to brown liquid	Yellow to orange liquid	Yellow to orange liquid
Date	01.12.2014	17.07.2014	31.10.2014	20.07.2012	11.01.2011	16.10.2012

Table S2 - Baytubes® C150 HP product specification.

Property	Value	Unit	Method
C-Purity	> 99	%	Elementary analysis
Free amorphous carbon	Not detectable	%	TEM
Number of walls	3-15	-	TEM
Outer mean diameter	13-16	nm	TEM
Outer diameter distribution	5-20	nm	TEM
Inner mean diameter	4	nm	TEM
Inner diameter distribution	2-6	nm	TEM
Length	1-10	µm	SEM
Bulk density	140-230	$kg \cdot m^{-3}$	EN ISO 60

Table S3. Thermal conductivities of phosphonium ionic liquids based on the phosphonium cation as a function of temperature at p = 0.1 MPa[a]

Ionic liquid	T / K	λ / W m^{-1} K^{-1}
$[P_{66614}][N(CN)_2)]$	293.6	0.163 ± 0.004
	303.9	0.163 ± 0.004
	314.9	0.161 ± 0.004
	324.5	0.161 ± 0.005
	333.4	0.161 ± 0.004
	343.4	0.161 ± 0.005
$[P_{66614}][Br]$	293.4	0.156 ± 0.004
	303.2	0.156 ± 0.004
	313.3	0.155 ± 0.004
	323.7	0.155 ± 0.004
	333.8	0.154 ± 0.004
	343.4	0.153 ± 0.004

[a] With expanded uncertainty at 0.95 level of confidence (k =2).

Table S4 - Coefficients of equation 12 for pure ionic liquids and IoNanofluids[a]

Fluid	$a_1 \pm s_{a1}$ /W m^{-1} K^{-1}	10^5 ($a_2 \pm s_{a2}$) /W m^{-1} K^{-2}	$10^5 s$ W m^{-1} K^{-1}
[P_{66614}][dca]	0.17281 ± 0.0040	-3.477 ± 1.2	52
[P_{66614}][Br]	0.17515 ± 0.0034	-6.341 ± 1.1	46
[P_{66614}][dca] 0.5% w/w MWCNTs	0.18345 ± 0.0112	-7.329 ± 3.6	105
[C_2mim][SCN]	0.41154 ± 0.059	-75.073 ± 18.6	781
[C_4mim][SCN]	0.26928 ± 0.031	-32.967 ± 9.6	402
[C_2mim][C(CN)$_3$]	0.37840 ± 0.052	-64.221 ± 16.2	672
[C_4mim][C(CN)$_3$]	0.26259 ± 0.035	-30.423 ± 10.9	456
[C_2mim][SCN] 0.5% w/w MWCNTs	0.20417 ± 0.0010	-5.571 ± 0.32	12
[C_2mim][SCN] 1% w/w MWCNTs	0.21206 ± 0.0018	-6.028 ± 0.55	21
[C_4mim][SCN] 0.5% w/w MWCNTs	0.18254 ± 0.0048	-3.140 ± 1.5	57
[C_4mim][SCN] 1% w/w MWCNTs	0.18913 ± 0.0056	-2.707 ± 1.8	67
[C_2mim][C(CN)$_3$] 0.5% w/w MWCNTs	0.21667 ± 0.015	-10.074 ± 4.8	185
[C_2mim][C(CN)$_3$] 1% w/w MWCNTs	0.21763 ± 0.0036	-8.471 ± 1.1	43
[C_4mim][C(CN)$_3$] 0.5% w/w MWCNTs	0.19499 ± 0.0030	-6.475 ± 0.94	36
[C_4mim][C(CN)$_3$] 1% w/w MWCNTs	0.20155 + 0.0013	-6.988 ± 0.39	15

[a] With expanded uncertainty at 0.95 level of confidence (k =2).

Table S5. Thermal conductivities of the ionic liquids as a function of temperature at p = 0.1 MPa[a]

Ionic liquid	T / K	λ / W m^{-1} K^{-1}
[C_2mim][SCN]	293.6	0.185 ± 0.004
	303.4	0.182 ± 0.005
	313.6	0.182 ± 0.006
	323.7	0.178 ± 0.009
	333.9	0.163 ± 0.017
	343.6	0.145 ± 0.010
[C_4mim][SCN]	293.8	0.169 ± 0.004
	303.2	0.169 ± 0.004
	313.4	0.169 ± 0.005
	323.6	0.167 ± 0.005
	333.9	0.160 ± 0.008
	343.4	0.152 ± 0.017
[C_2mim][C(CN)$_3$]	294.0	0.188 ± 0.005
	303.3	0.190 ± 0.005

	313.2	0.176 ± 0.008
	323.8	0.167 ± 0.019
	333.5	0.156 ± 0.018
	343.2	0.166 ± 0.026
$[C_4mim][C(CN)_3]$	293.7	0.171 ± 0.004
	303.4	0.170 ± 0.004
	313.5	0.171 ± 0.006
	323.5	0.168 ± 0.008
	332.9	0.154 ± 0.014
	343.9	0.160 ± 0.020

[a] Standard uncertainties are $u(T)$ = 0.1 K, $u(p)$ = 1 kPa and the experimental expanded uncertainty $U_c = U_c(\lambda)$ = 0.004 to 0.02 W m^{-1} K^{-1} with 0.95 level of confidence (k = 2).

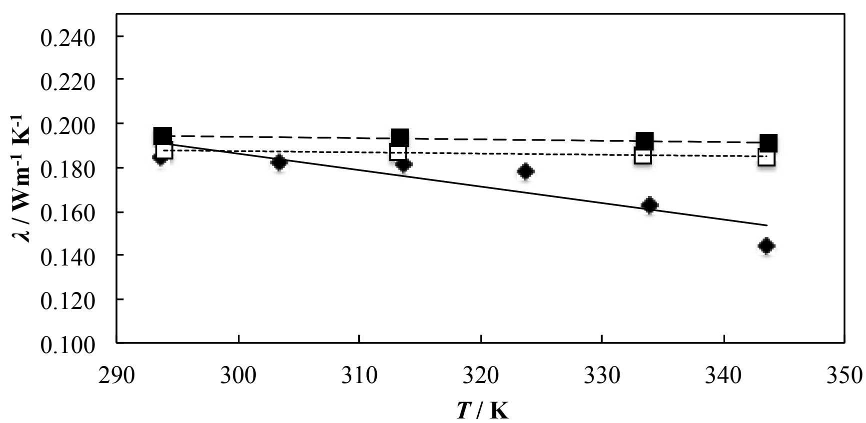

Figure S1. Plot of the thermal conductivity of pure $[C_2mim][SCN]$ and its IoNanofluids (INF) as a function of temperature. ◆ – $[C_2mim][SCN]$ pure; □ – INF 0.5% w/w MWCNTs; ■ – INF 1% w/w MWCNTs; lines are given by equation 12 with coefficients shown in Table S4.

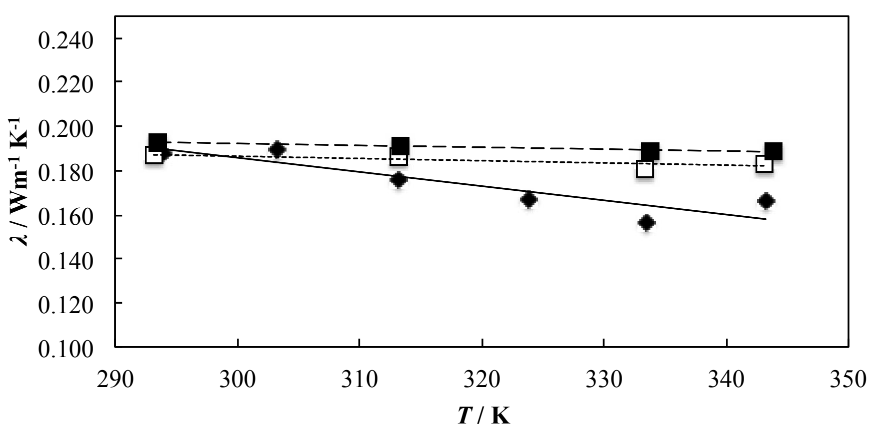

Figure S2. Plot of the thermal conductivity of pure $[C_2mim][C(CN)_3]$ and its IoNanofluids (INF) as a function of temperature. ◆ – $[C_2mim][C(CN)_3]$ pure; □ – INF 0.5% w/w MWCNTs; ■ – INF 1% w/w MWCNTs; lines are given by equation 12 with coefficients shown in Table S4.

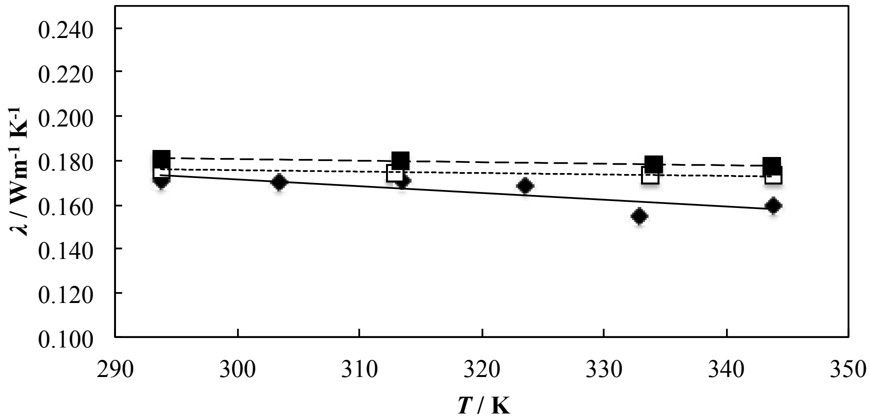

Figure S3. Plot of the thermal conductivity of pure $[C_4mim][C(CN)_3]$ and its IoNanofluids (INF) as a function of temperature. ◆ – $[C_4mim][C(CN)_3]$ pure; □ – INF 0.5% w/w MWCNTs; ■ – INF 1% w/w MWCNTs; lines are given by equation 12 with coefficients shown in Table S3.

Table S6 – Enhancement (%) of density and viscosity of dicyanamide IoNanofluids[13-14]

Fluid	T/K	ρ		η	
		0.5% w/w	1% w/w	0.5% w/w	1% w/w
$[C_2mim][N(CN)_2]$	313.15	0.26	0.45	77.5	137.4
	333.15	0.27	0.43	111.1	188.0
	343.15	0.23	0.40	143.4	221.6
$[C_4mim][N(CN)_2]$	313.15	0.32	0.65	80.7	159.5
	333.15	0.22	0.42	147.4	225.2
	343.15	0.20	0.33	180.9	245.3
$[C_4mpyr][N(CN)_2]$	313.15	0.23	0.60	27.8	101.4
	333.15	0.22	0.59	70.7	155.3
	343.15	0.23	0.61	94.8	182.7

Table S7 – Thermophysical properties and heat transfer area (A_0) for commercial heat transfer fluids.

Fluid	T/ K	λ / W m^{-1} K^{-1}	η / mPa s	C_P / J kg^{-1} K^{-1}	ρ / kg m^{-3}	A_0 / m^2

Dowtherm A	293.15	0.139	4.29	1573	1059.6	178.69
	303.15	0.137	3.25	1601	1051.7	161.08
	313.15	0.136	2.56	1630	1043.8	**147.70**
	323.15	0.134	2.07	1658	1035.8	137.05
	333.15	0.132	1.72	1687	1027.8	**128.65**
	343.15	0.131	1.46	1715	1019.7	**121.88**
Dowtherm G	293.15	0.126	12.5	1546	1046.9	298.51
	303.15	0.125	8.40	1581	1039.1	253.19
	313.15	0.124	6.10	1616	1031.4	**222.54**
	323.15	0.123	4.60	1651	1023.6	199.01
	333.15	0.122	3.65	1686	1015.9	**182.08**
	343.15	0.121	2.96	1720	1008.1	**168.32**
Dowtherm J	293.15	0.128	0.91	1828	863.7	112.90
	303.15	0.126	0.79	1859	856.2	108.36
	313.15	0.124	0.70	1890	848.7	**104.79**
	323.15	0.122	0.63	1923	841.0	101.95
	333.15	0.120	0.56	1955	833.2	**98.82**
	343.15	0.118	0.51	1989	825.4	**96.68**
Dowtherm MX	293.15	0.123	20.3	1610	962.2	393.62
	303.15	0.122	13.5	1642	955.2	331.17
	313.15	0.121	9.44	1675	948.2	**285.32**
	323.15	0.120	6.86	1707	941.1	250.47
	333.15	0.119	5.15	1740	934.0	**223.27**
	343.15	0.118	3.98	1772	926.9	**201.80**
Dowtherm Q	293.15	0.122	4.00	1653	965.4	196.70
	303.15	0.121	3.04	1685	957.8	177.05
	313.15	0.120	2.37	1716	950.2	**161.39**
	323.15	0.118	1.89	1748	942.7	148.57
	333.15	0.117	1.54	1779	935.1	**138.21**
	343.15	0.116	1.28	1811	927.6	**129.74**
Dowtherm RP	293.15	0.131	42.82	1620	1029.2	497.54
	303.15	0.130	23.99	1650	1022.3	387.73
	313.15	0.129	14.92	1680	1015.3	**317.42**
	323.15	0.128	10.05	1710	1008.3	269.74
	333.15	0.126	7.19	1739	1001.3	**235.76**
	343.15	0.125	5.39	1769	994.2	**210.52**
Dowtherm T	293.15	0.130	30.55	1962	873.2	460.01
	303.15	0.128	19.09	1992	866.4	378.35
	313.15	0.127	12.80	2022	859.5	**320.18**
	323.15	0.126	9.07	2052	852.6	278.06
	333.15	0.125	6.71	2082	845.7	**246.40**
	343.15	0.124	5.15	2111	838.8	**222.11**
Syltherm XLT	293.15	0.111	1.40	1772	855.3	145.75
	303.15	0.109	1.20	1793	845.0	139.54
	313.15	0.106	1.00	1814	834.7	**132.28**
	323.15	0.104	0.91	1835	824.5	129.73
	333.15	0.102	0.80	1856	814.2	**125.72**
	343.15	0.100	0.70	1877	803.9	**121.71**
Syltherm 800	293.15	0.135	10.03	1608	934.99	280.20
	303.15	0.133	8.32	1625	926.0	262.11
	313.15	0.131	7.00	1643	917.07	**246.75**
	323.15	0.130	5.96	1660	908.18	233.53
	333.15	0.128	5.12	1677	899.32	**222.05**
	343.15	0.126	4.43	1694	890.49	**211.88**
Syltherm HF	293.15	0.107	1.84	1682	871.76	165.70
	303.15	0.105	1.58	1707	861.65	158.72
	313.15	0.102	1.37	1731	851.54	**152.76**
	323.15	0.100	1.19	1756	841.43	147.12

	333.15	0.097	1.05	1780	831.32	**142.77**
	343.15	0.095	0.93	1805	821.21	**138.82**
Paratherm HR	293.15	0.118	27.0	1900	943.0	442.50
	303.15	0.117	16.0	2000	937.0	349.63
	313.15	0.116	10.0	2000	931.0	**288.24**
	323.15	0.115	6.90	2000	925.0	248.56
	333.15	0.114	5.00	2000	919.0	**219.27**
	343.15	0.114	3.80	2000	913.0	**197.62**
Paratherm MR	293.15	0.132	8.20	2400	799.0	259.23
	303.15	0.131	5.80	2400	792.0	226.60
	313.15	0.130	4.30	2400	785.0	**202.48**
	323.15	0.129	3.30	2400	778.0	183.80
	333.15	0.128	2.70	2500	771.0	**169.44**
	343.15	0.127	2.20	2500	764.0	**157.93**
Globaltherm Omnitech	293.15	0.140	4.24	1580	1060.0	176.63
	313.15	0.138	2.61	1630	1044.0	**147.29**
	333.15	0.135	1.75	1690	1028.0	**127.94**
Globaltherm Syntec	293.15	0.120	100.8	1600	1008.0	789.30
	313.15	0.119	26.04	1670	994.0	**432.43**
	333.15	0.118	11.27	1740	980.0	**301.52**

Table S8 - Thermophysical properties and heat transfer area (A_0) for pure ionic liquids.

Fluid	T/ K	λ / W m^{-1} K^{-1}	η / mPa s	C_P / J kg^{-1} K^{-1}	ρ / kg m^{-3}	A_0 / m^2
$[C_2mim][SCN]$	313.15	0.182	15.5 [c]	2082.13 [h]	1112.9 [m]	**229.43**
	333.15	0.163	9.53 [c]	2157.16 [h]	1100.9 [m]	**199.86**
	343.15	0.145	7.77 [c]	2216.84 [h]	1094.9 [m]	**196.08**
$[C_4mim][SCN]$	313.15	0.169	30.5 [c]	2021.79 [h]	1066.6 [n]	**332.82**

	333.15	0.160	16.1 [c]	2098.83 [h]	1054.8 [n]	**260.86**
	343.15	0.152	12.3 [c]	2158.13 [h]	1048.9 [n]	**239.78**
$[C_2mim][N(CN)_2]$	313.15	0.178 [a]	8.87 [d]	1875.74 [h]	1093.5 [a]	**192.96**
	333.15	0.170 [a]	6.15 [d]	1934.99 [h]	1081.0 [a]	**170.81**
	343.15	0.165 [a]	5.32 [d]	1981.83 [h]	1076.1 [a]	**163.41**
$[C_4mim][N(CN)_2]$	313.15	0.163 [a]	13.9 [d]	1875.67 [i]	1051.0 [a]	**251.75**
	333.15	0.153 [a]	8.76 [d]	1895.16 [i]	1040.6 [a]	**216.52**
	343.15	0.150 [a]	7.40 [d]	1909.77 [i]	1035.7 [a]	**204.55**
$[C_4mpyr][N(CN)_2]$	313.15	0.153 [a]	19.96 [d]	2534.81 [j]	1006.1 [a]	**287.29**
	333.15	0.147 [a]	12.52 [d]	2659.63 [j]	995.60 [a]	**240.01**
$[C_2mim][C(CN)_3]$	313.15	0.176	9.50 [c]	1818.81 [k]	1070.6 [o]	**204.55**
	333.15	0.156	6.06 [c]	1858.57 [k]	1057.3 [o]	**183.18**
	343.15	0.166	5.03 [c]	1898.33 [k]	1050.5 [o]	**163.84**
$[C_2mim][C_2H_5SO_4]$	313.15	0.171 [b]	50.9 [e]	1680.14 [i]	1227.6 [i]	**393.71**
	333.15	0.165 [b]	25.2 [e]	1718.23 [i]	1214.2 [i]	**297.34**
	343.15	0.165 [b]	18.7 [e]	1739.39 [i]	1207.6 [i]	**262.01**
$[C_4mim][(CF_3SO_2)_2N]$	313.15	0.114 [b]	28.3 [f]	1373.52 [i]	1422.0 [i]	**374.31**
	333.15	0.112 [b]	15.4 [f]	1402.14 [i]	1403.0 [i]	**291.95**
	343.15	0.111 [b]	11.9 [f]	1414.06 [i]	1394.0 [i]	**264.09**
$[P_{66614}][N(CN)_2]$	313.15	0.161	186.8 [g]	1927.62 [l]	890.3 [g]	**894.69**
	333.15	0.161	76.1 [g]	2000.36 [l]	879.0 [g]	**595.75**
	343.15	0.161	52.0 [g]	2036.73 [l]	873.4 [g]	**502.40**

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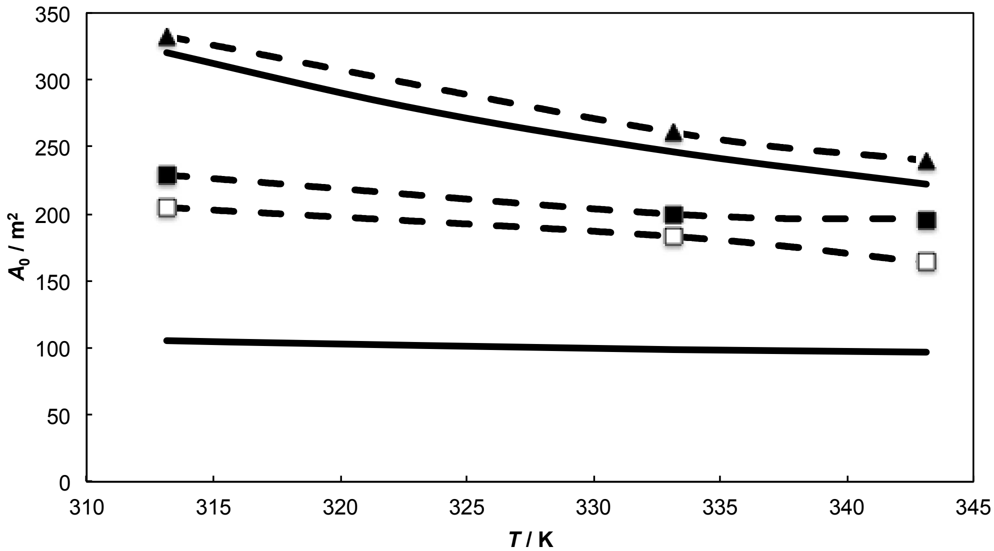

Figure S4 – Heat transfer area for pure ionic liquids. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs. ■ – [C_2mim][SCN]; ▲ – [C_4mim][SCN]; □ – [C_2mim][C(CN)$_3$].

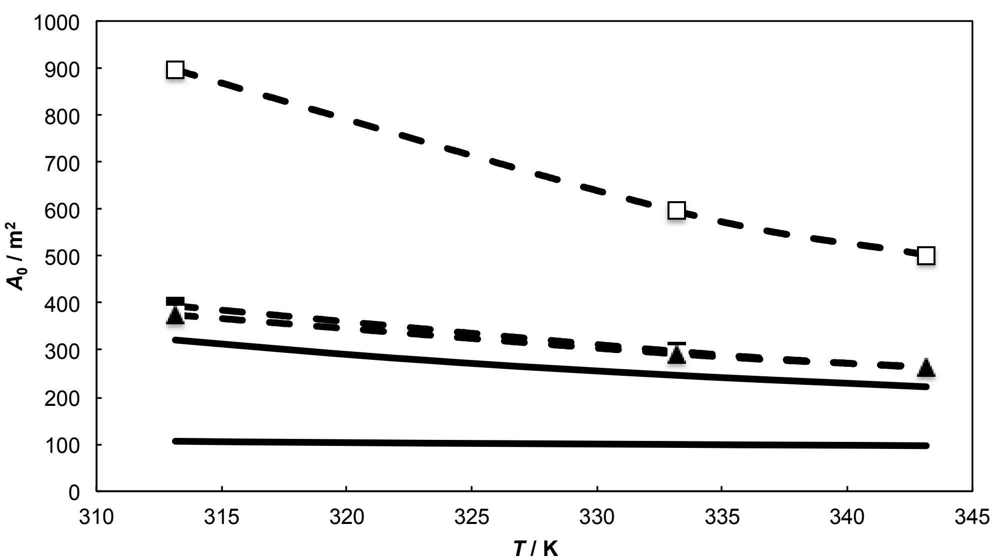

Figure S5 – Heat transfer area for pure ionic liquids. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs. ■ – [C_2mim][$C_2H_5SO_4$]; ▲ – [C_4mim][$(CF_3SO_2)_2N$]; □ – [P_{66614}][$N(CN)_2$].

Table S9 - Thermophysical properties and heat transfer area (A_0) for INFs 0.5% w/w MWCNTs.

Base fluid	T/ K	λ / W m^{-1} K^{-1}	η / mPa s	C_P / J kg^{-1} K^{-1}	ρ / kg m^{-3}	A_0 / m^2

$[C_2mim][SCN]$	313.15	0.187	27.5	2082.13	1115.8	**286.85**
	333.15	0.186	20.1	2157.16	1103.8	**251.42**
	343.15	0.185	18.9	2216.84	1097.5	**244.86**
$[C_4mim][SCN]$	313.15	0.173	55.1	2021.79	1070.0	**423.39**
	333.15	0.171	39.7	2098.83	1057.1	**368.75**
	343.15	0.172	34.7	2158.13	1051.1	**344.77**
$[C_2mim][N(CN)_2]$	313.15	0.182 [a]	15.7	1875.74	1096.3 [a]	**240.84**
	333.15	0.179 [a]	13.0	1934.99	1083.9 [a]	**224.21**
	343.15	0.179 [a]	12.9	1981.83	1078.6 [a]	**223.19**
$[C_4mim][N(CN)_2]$	313.15	0.171 [a]	25.1 [c]	1875.67	1054.4 [a]	**313.71**
	333.15	0.169 [a]	21.7 [c]	1895.16	1042.9 [a]	**298.05**
	343.15	0.168 [a]	20.8 [c]	1909.77	1037.8 [a]	**294.16**
$[C_4mpyr][N(CN)_2]$	313.15	0.160 [a]	25.5 [c]	2534.81	1008.4 [a]	**309.92**
	333.15	0.158 [a]	21.4 [c]	2659.63	997.8 [a]	**287.56**
$[C_2mim][C(CN)_3]$	313.15	0.186	16.9	1818.81	1073.4	**250.71**
	333.15	0.181	12.8	1858.57	1060.1	**227.57**
	343.15	0.183	12.2	1898.33	1052.9	**221.68**
$[C_2mim][C_2H_5SO_4]$	313.15	0.178 [b]	90.3	1680.14	1230.7	**493.19**
	333.15	0.177 [b]	53.2	1718.23	1217.5	**392.49**
	343.15	0.177 [b]	45.5	1739.39	1210.4	**366.93**
$[C_4mim][(CF_3SO_2)_2N]$	313.15	0.121 [b]	51.1	1373.52	1426.6	**466.31**
	333.15	0.119 [b]	38.1	1402.14	1406.1	**415.58**
	343.15	0.120 [b]	33.5	1414.06	1396.8	**391.95**

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Table S10 - Thermophysical properties and heat transfer area (A_0) for INFs 1% w/w MWCNTs.

Base fluid	T/ K	λ / W m^{-1} K^{-1}	η / mPa s	C_P / J kg^{-1} K^{-1}	ρ / kg m^{-3}	A_0 / m^2

$[C_2mim][SCN]$	313.15	0.193	36.8	2082.13	1117.9	**318.24**
	333.15	0.192	27.4	2157.16	1105.5	**280.95**
	343.15	0.191	25.0	2216.84	1099.3	**269.79**
$[C_4mim][SCN]$	313.15	0.181	79.1	2021.79	1073.5	**481.55**
	333.15	0.179	52.2	2098.83	1059.2	**403.18**
	343.15	0.180	42.6	2158.13	1052.4	**366.25**
$[C_2mim][N(CN)_2]$	313.15	0.191 [a]	21.1 [c]	1875.74	1098.4 [a]	**264.04**
	333.15	0.187 [a]	17.7 [c]	1934.99	1085.6 [a]	**248.40**
	343.15	0.187 [a]	17.1 [c]	1981.83	1080.4 [a]	**243.93**
$[C_4mim][N(CN)_2]$	313.15	0.177 [a]	36.1 [c]	1875.67	1057.8 [a]	**358.23**
	333.15	0.174 [a]	28.5 [c]	1895.16	1045.0 [a]	**328.74**
	343.15	0.174 [a]	25.5 [c]	1909.77	1039.1 [a]	**314.23**
$[C_4mpyr][N(CN)_2]$	313.15	0.167 [a]	40.2 [c]	2534.81	1012.1 [a]	**366.42**
	333.15	0.162 [a]	31.9 [c]	2659.63	1001.5 [a]	**335.62**
$[C_2mim][C(CN)_3]$	313.15	0.192	22.6	1818.81	1075.4	**277.74**
	333.15	0.189	17.5	1858.57	1061.8	**252.24**
	343.15	0.189	16.2	1898.33	1054.7	**243.93**
$[C_2mim][C_2H_5SO_4]$	313.15	0.184 [b]	120.8	1680.14	1233.1	**548.77**
	333.15	0.183 [b]	72.6	1718.23	1219.4	**439.97**
	343.15	0.183 [b]	60.1	1739.39	1212.4	**405.34**
$[C_4mim][(CF_3SO_2)_2N]$	313.15	0.126 [b]	73.5	1373.52	1431.2	**532.32**
	333.15	0.125 [b]	50.0	1402.14	1408.9	**453.72**
	343.15	0.125 [b]	41.2	1414.06	1398.6	**417.81**

a - França, J. M. P.; Reis, F.; Vieira, S. I. C.; Lourenço, M. J. V.; Santos, F. J. V.; Nieto de Castro, C. A.; Pádua, A. A. H., Thermophysical properties of ionic liquid dicyanamide (DCA) nanosystems. *J. Chem. Thermodyn*. **2014**, 79, 248-257.

b - França, J. M. P.; Vieira, S. I. C.; Lourenço, M. J. V.; Murshed, S. M. S.; Nieto de Castro, C. A., Thermal Conductivity of [C4mim][(CF3SO2)2N] and [C2mim][EtSO4] and Their IoNanofluids with Carbon Nanotubes: Experiment and Theory. *J. Chem. Eng. Data* **2013**, 58 (2), 467-476.

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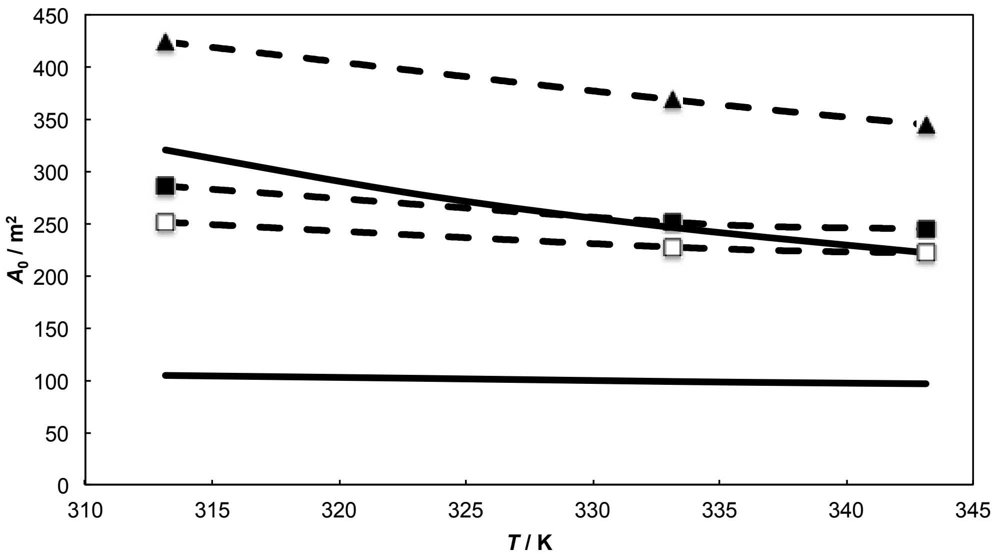


Figure S6 – Heat transfer area for IoNanofluids 0.5% w/w MWCNTs considering C_P of pure ionic liquid. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs. ■ – [C_2mim][SCN]; ▲ – [C_4mim][SCN]; □ – [C_2mim][C(CN)$_3$].

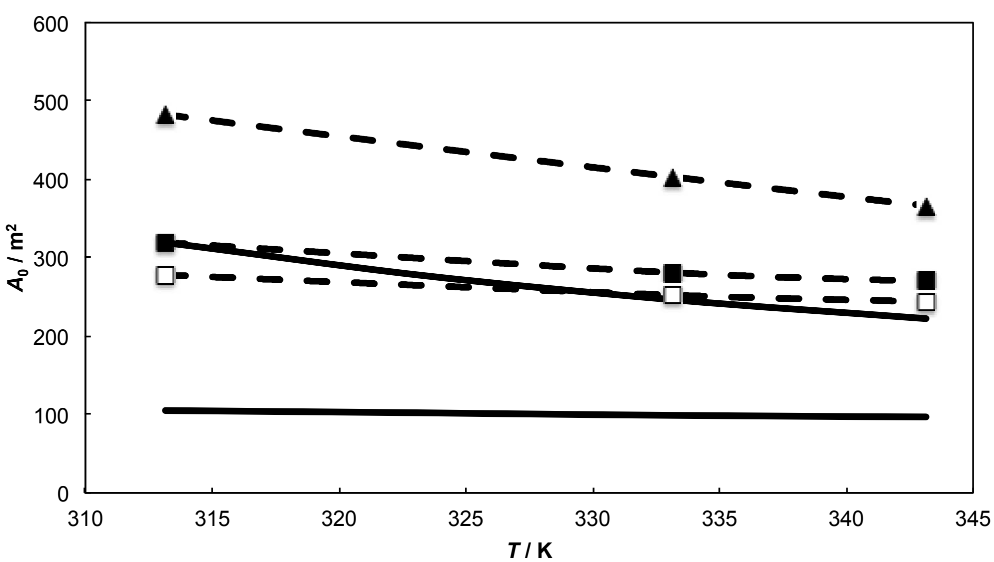
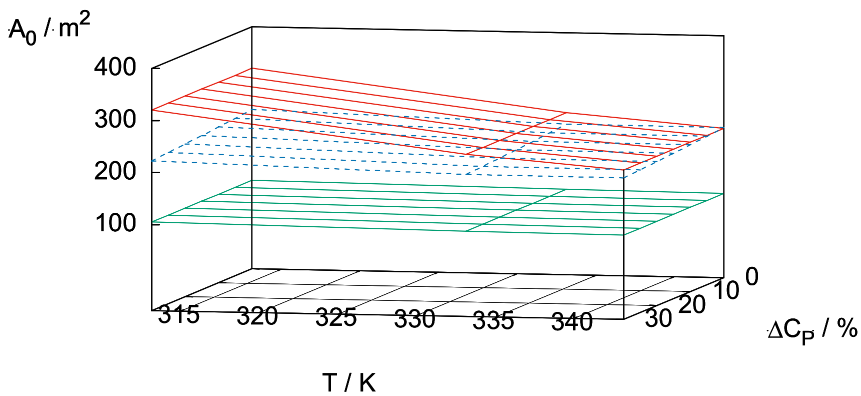


Figure S7 – Heat transfer area for IoNanofluids 1% w/w MWCNTs considering C_P of pure ionic liquid. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs. ■ – [C_2mim][SCN]; ▲ – [C_4mim][SCN]; □ – [C_2mim][C(CN)$_3$].

Table S11 – Increase in heat transfer area (%) of the IoNanofluids regarding pure ionic liquids.

Base fluid	T / K	ΔA_0 0.5% w/w	ΔA_0 1% w/w
$[C_2mim][SCN]$	313.15	25.03	38.71
	333.15	25.80	40.58
	343.15	24.88	37.59
$[C_4mim][SCN]$	313.15	27.21	44.69
	333.15	41.36	54.56
	343.15	43.78	52.74
$[C_2mim][N(CN)_2]$	313.15	24.81	36.84
	333.15	31.26	45.42
	343.15	36.58	49.27
$[C_4mim][N(CN)_2]$	313.15	24.61	42.30
	333.15	37.66	51.83
	343.15	43.80	53.62
$[C_4mpyr][N(CN)_2]$	313.15	7.88	27.54
	333.15	19.81	39.83
$[C_2mim][C(CN)_3]$	313.15	22.56	35.78
	333.15	24.23	37.70
	343.15	35.31	48.89



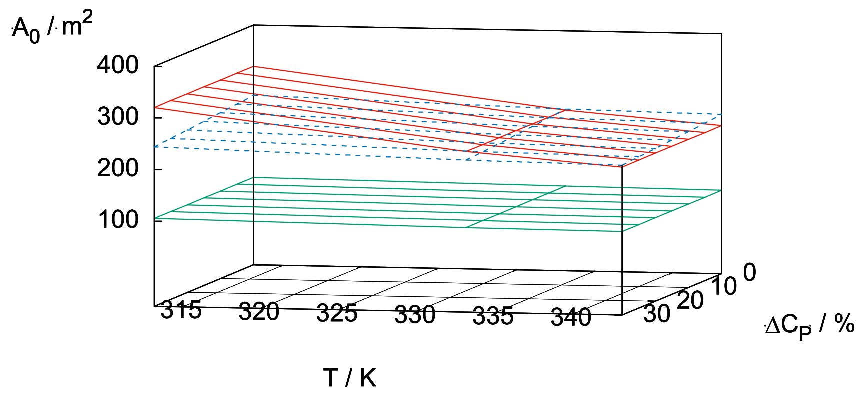
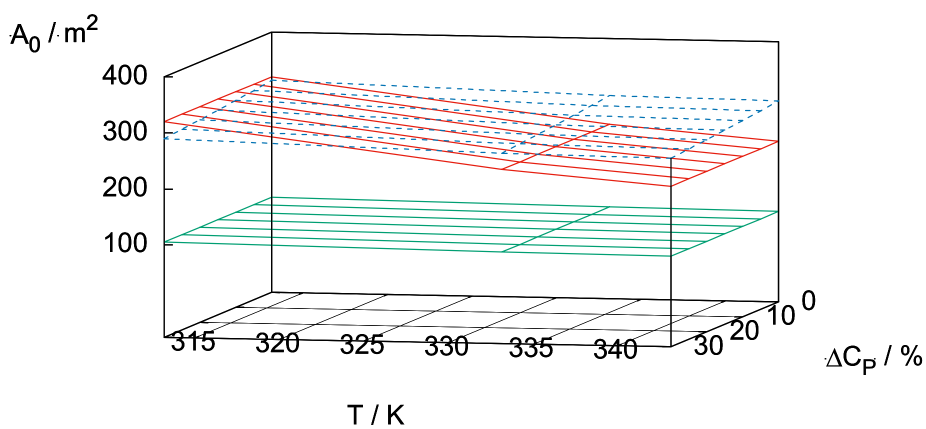


Figure S8 – Heat transfer area for $[C_2mim][N(CN)_2]$ based IoNanofluids considering a variation up to +30% of C_P of the base ionic liquid. Top: 0.5% w/w MWCNTs; Bottom: 1% w/w MWCNTs. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs.



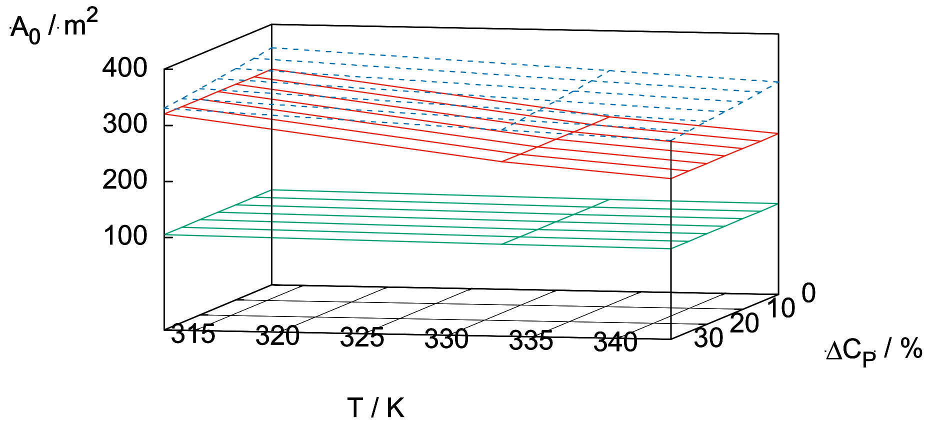
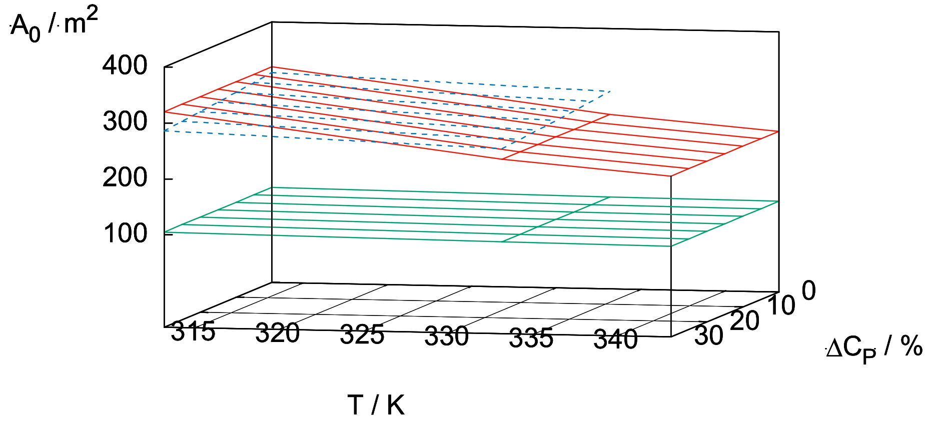


Figure S9 – Heat transfer area for $[C_4mim][N(CN)_2]$ based IoNanofluids considering a variation up to +30% of C_P of pure ionic liquid. Top: 0.5% w/w MWCNTs; Bottom: 1% w/w MWCNTs. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs.



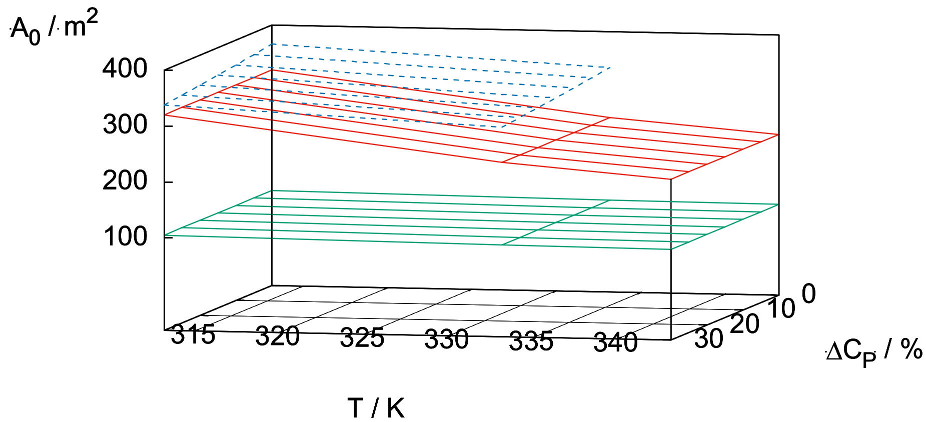


Figure S10 – Heat transfer area for $[C_4mpyr][N(CN)_2]$ based IoNanofluids considering a variation up to +30% of C_P of pure ionic liquid. Top: 0.5% w/w MWCNTs; Bottom: 1% w/w MWCNTs. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs.

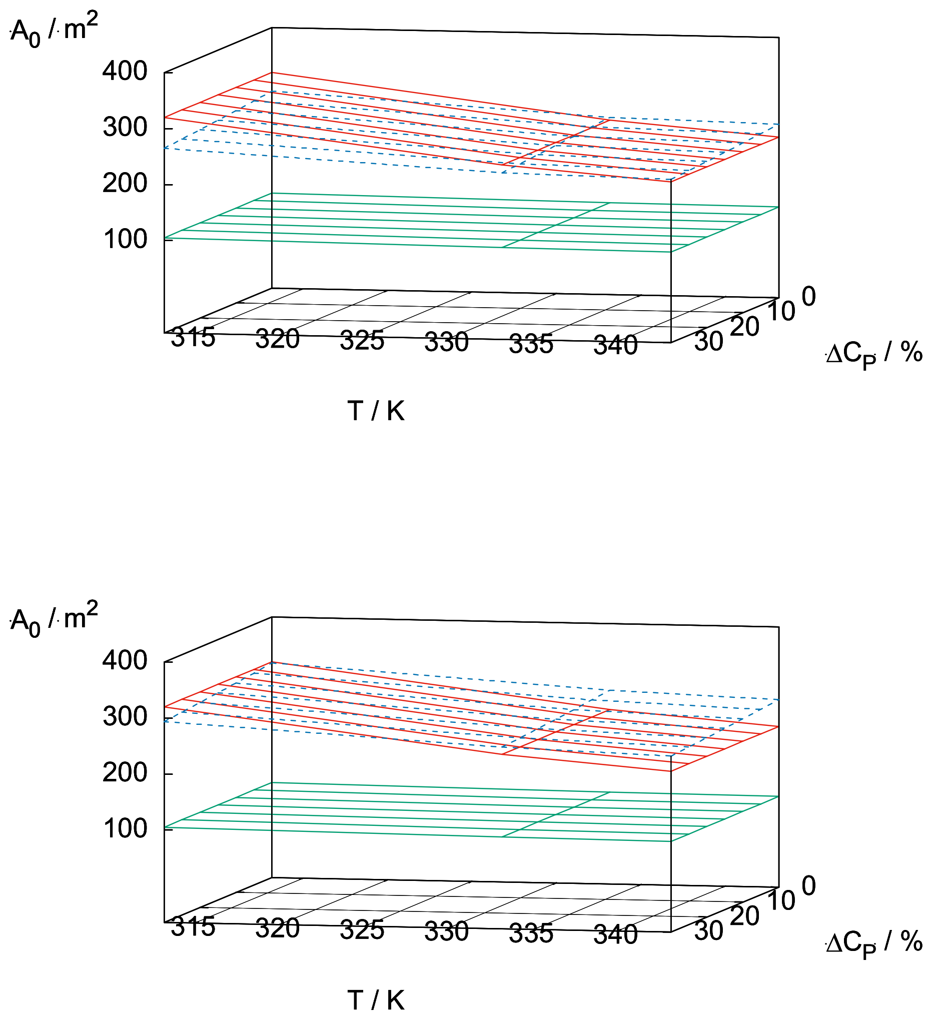


Figure S11 – Heat transfer area for $[C_2mim][SCN]$ based IoNanofluids considering a variation up to +30% of C_P of pure ionic liquid. Top: 0.5% w/w MWCNTs; Bottom: 1% w/w MWCNTs. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs.

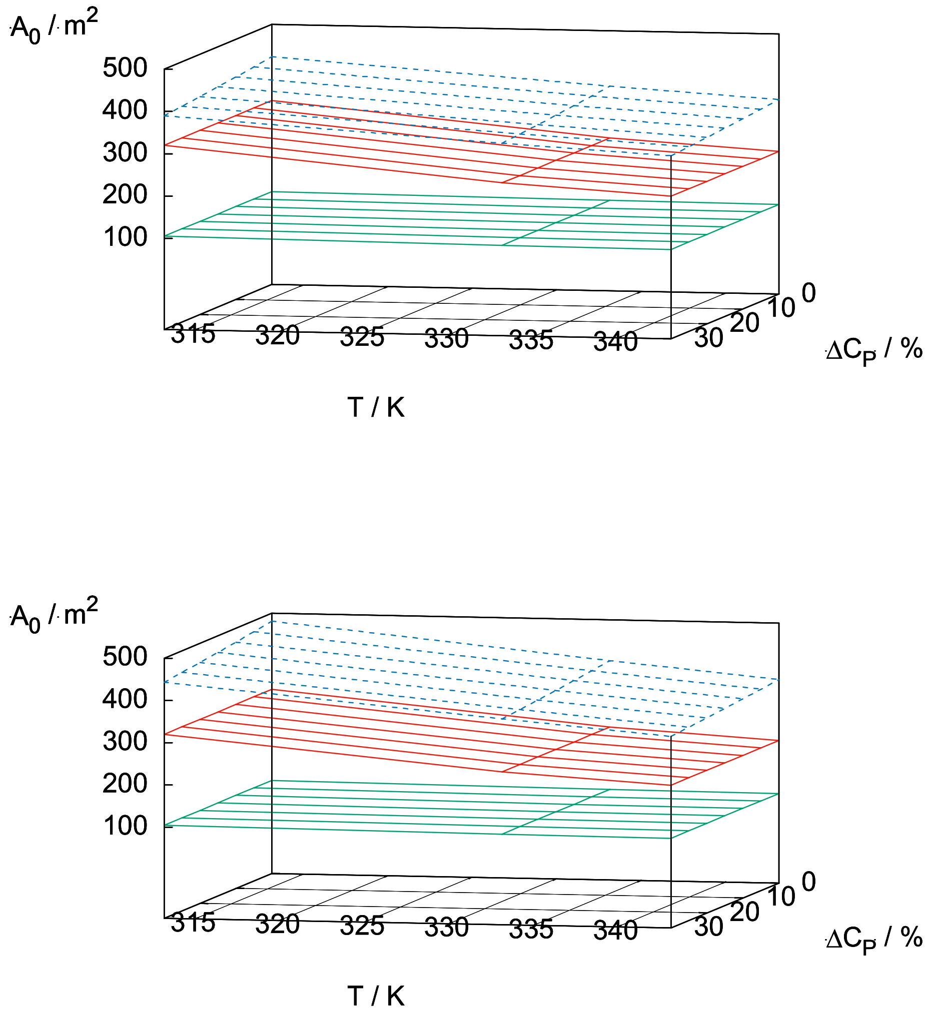
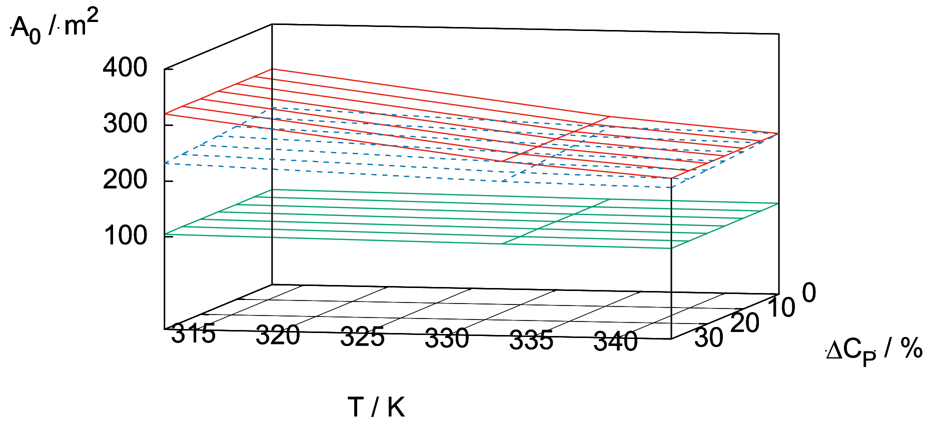


Figure S12 – Heat transfer area for [C_4mim][SCN] based IoNanofluids considering a variation up to +30% of C_P of pure ionic liquid. Top: 0.5% w/w MWCNTs; Bottom: 1% w/w MWCNTs. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs.



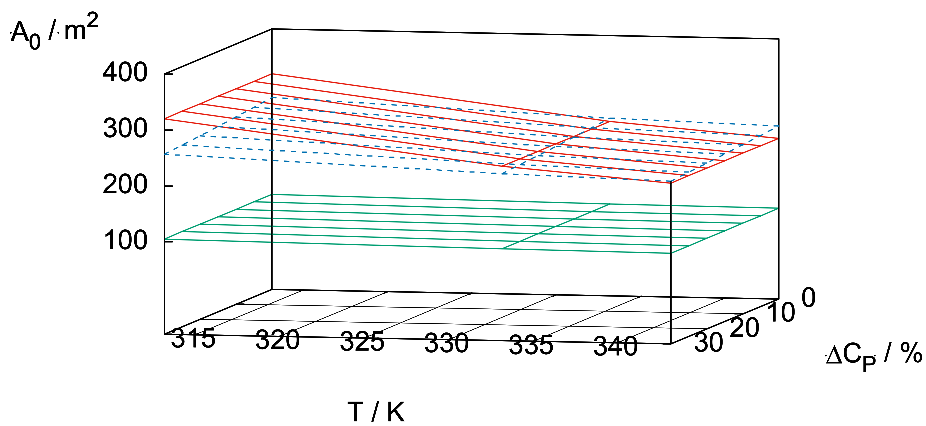


Figure S13 – Heat transfer area for $[C_2mim][C(CN)_3]$ based IoNanofluids considering a variation up to +30% of C_P of pure ionic liquid. Top: 0.5% w/w MWCNTs; Bottom: 1% w/w MWCNTs. Solid lines represent lowest (Dowtherm J) and highest (Dowtherm T) values obtained for commercial HTFs.