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# A green approach to offset the perturbation action of 1-butyl-3-methylimidazolium iodide on α-chymotrypsin

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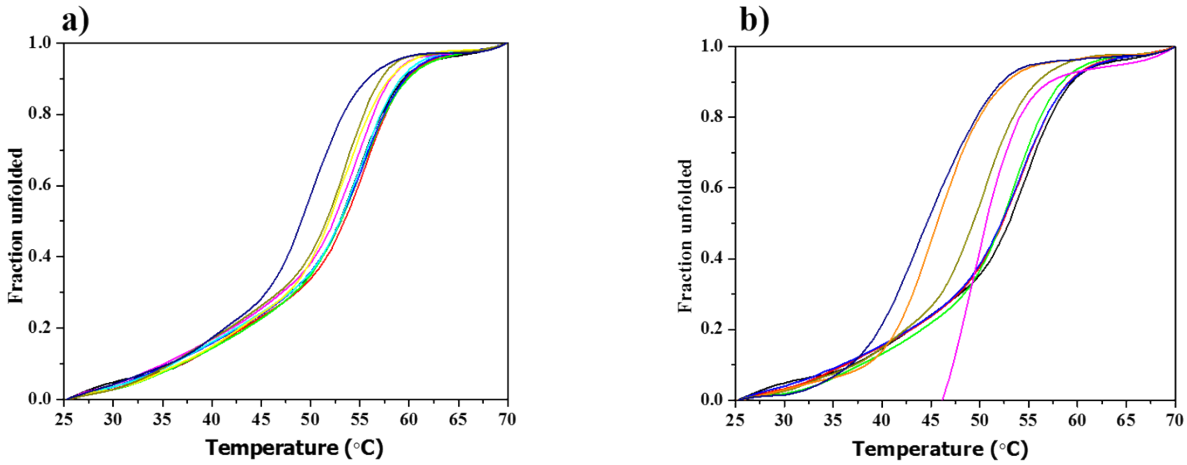


**Fig. S1** Fraction of unfolded α-chymotrypsin (CT) in tris-HCl buffer in the presence of [Bmim][Br] (a); [Bmim][I] (b). The black, red, green, blue, cyan, magenta, yellow, dark yellow and navy color lines represent CT in buffer, 0.025, 0.05, 0.1, 0.15, 0.2, 0.25, 0.3 and 0.6 M, respectively, of [Bmim][Br] in panel a; black, red, green, blue, magenta, dark yellow, orange and navy color lines represent CT in buffer, 0.025, 0.05, 0.1, 0.2, 0.3, 0.4 and 0.6 M, respectively, of [Bmim][I] in panel b.

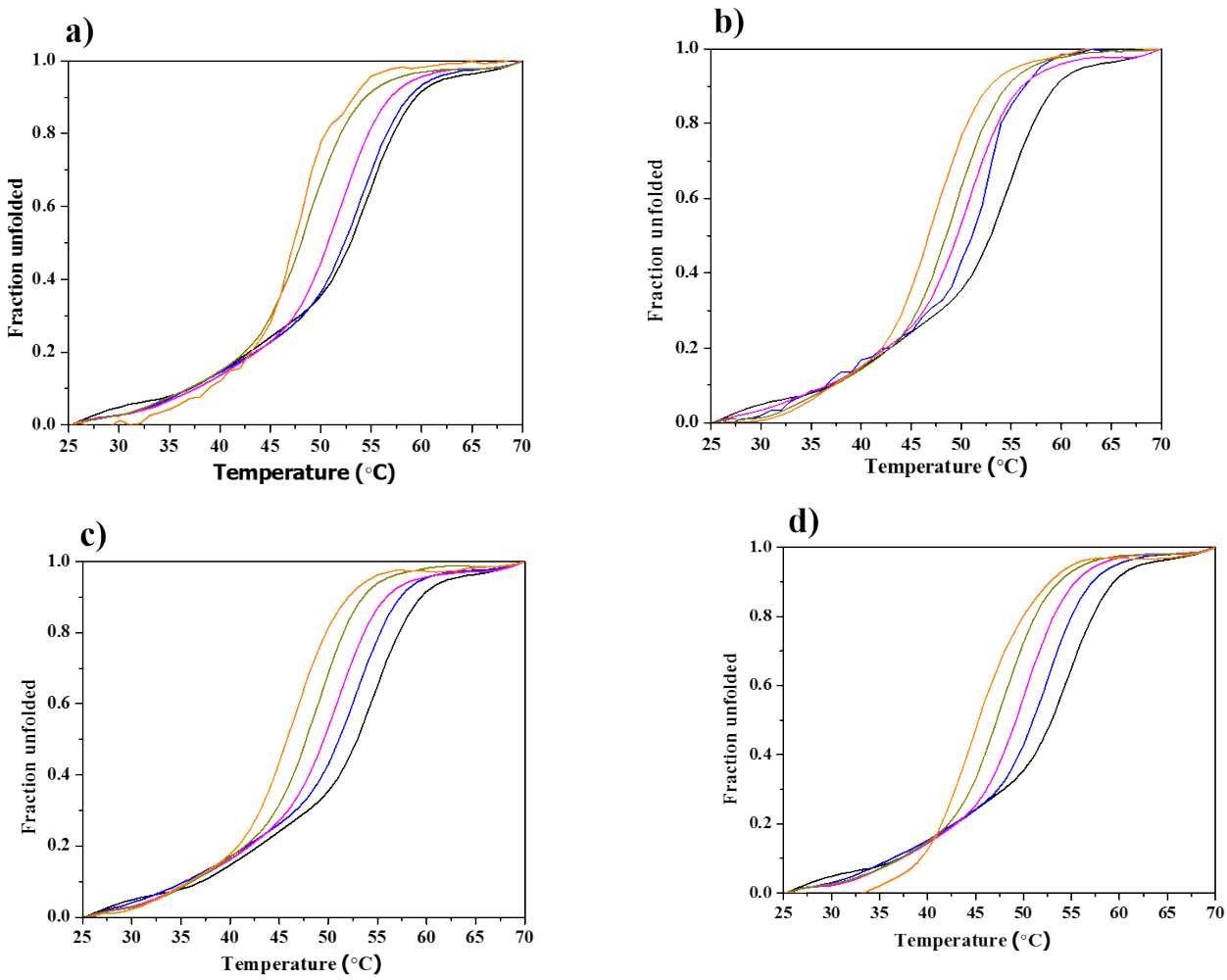


**Fig. S2** Fraction of unfolded α-chymotrypsin (CT) in tris-HCl buffer in the presence of [Bmim][Br] + [Bmim][I] mixture. The blue, magenta, dark yellow and orange lines represent mole ratios of [Bmim][Br] + [Bmim][I] mixture as 0.025:0.1, 0.025:0.2, 0.025:0.3 and 0.025:0.4 M respectively, in panel a; 0.5:0.1, 0.5:0.2, 0.5:0.3 and 0.5:0.4 M respectively, in panel b; 0.1:0.1, 0.1:0.2, 0.1:0.3 and 0.1:0.4 M respectively, in panel c; 0.2:0.1, 0.2:0.2, 0.2:0.3 and 0.2:0.4 M respectively, in panel d. The black color line represents in all panels α-chymotrypsin (CT) in tris-HCl buffer.

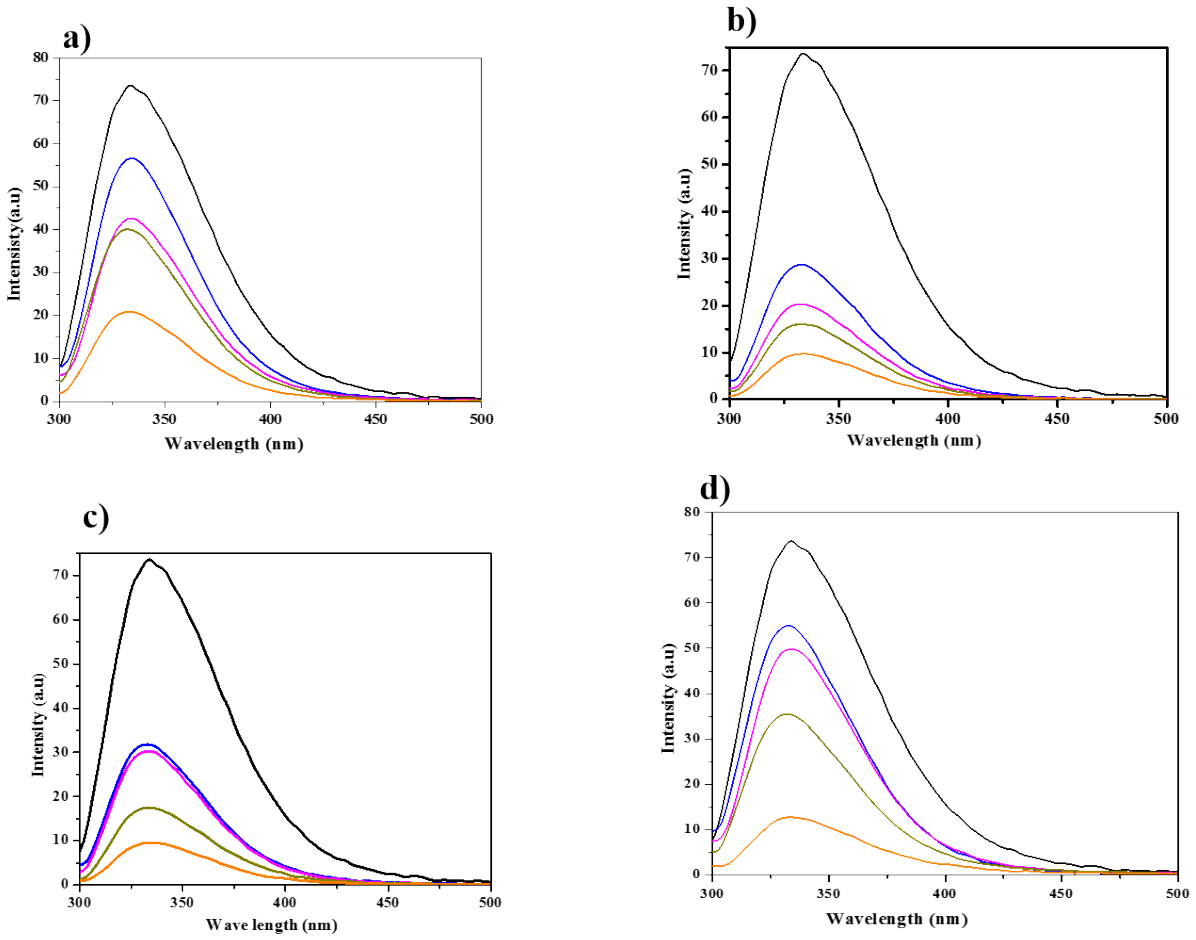


**Fig. S3** Fluorescence intensity changes for α-chymotrypsin (CT) in tris-HCl buffer in the presence of [Bmim][Br] + [Bmim][I] mixture. The blue, magenta, dark yellow and orange lines represent mole ratios of [Bmim][Br] + [Bmim][I] mixture as 0.025:0.1, 0.025:0.2, 0.025:0.3 and 0.025:0.4 M respectively, in panel a; 0.5:0.1, 0.5:0.2, 0.5:0.3 and 0.5:0.4 M respectively, in panel b; 0.1:0.1, 0.1:0.2, 0.1:0.3 and 0.1:0.4 M respectively, in panel c; 0.2:0.1, 0.2:0.2, 0.2:0.3 and 0.2:0.4 M respectively, in panel d. The black color line represents in all panels α-chymotrypsin (CT) in tris-HCl buffer.

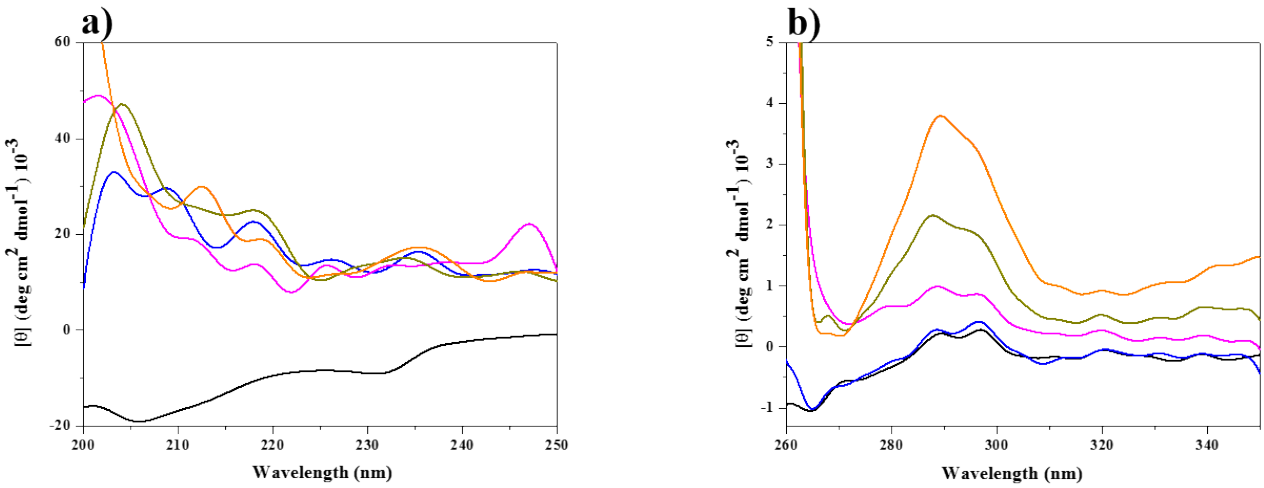


**Fig. S4** Far (a) and near (b) UV-CD spectra for α-chymotrypsin (CT) in tris-HCl in the presence of presence of [Bmim][Br] + [Bmim][I] mixture. The blue, magenta, dark yellow and orange lines represent mole ratios of [Bmim][Br] + [Bmim][I] mixture as 0.025:0.1, 0.025:0.2, 0.025:0.3 and 0.025:0.4 M respectively, in panels a and b. The black color line represents in both the panels is α-chymotrypsin (CT) in tris-HCl buffer.

**Table S1.** Transition temperature ($T_m$), enthalpy change ($\Delta H$) Gibbs free energy changes ($\Delta G_u$) and heat capacity change ($\Delta C_p$) at 25 °C for the α-chymotrypsin (CT) in tris HCl in the presence of various concentrations of ionic liquids (ILs) and ionic liquid mixtures determined by fluorescence spectroscopy.[a]

| **Sample** | **Tm/ $^0$C** | **ΔH/ k Cal mol$^{-1}$** | **$\Delta G_u$/ k Cal mol$^{-1}$** | **$\Delta C_p$/ k Cal mol$^{-1}$K$^{-1}$** |
|---|---|---|---|---|
| Buffer | 53.1 | 55.76 | 4.01 | 1.04 |
| 0.025 M [Bmim][Br] | 53.5 | 59.63 | 4.31 | 1.10 |
| 0.05 M [Bmim][Br] | 53.3 | 52.93 | 3.81 | 0.98 |
| 0.1 M [Bmim][Br] | 53.1 | 58.90 | 4.24 | 1.10 |
| 0.15 M [Bmim][Br] | 52.9 | 55.42 | 3.98 | 1.03 |
| 0.2 M [Bmim][Br] | 52.4 | 61.01 | 4.34 | 1.15 |
| 0.25 M [Bmim][Br] | 51.8 | 60.31 | 4.25 | 1.15 |
| 0.3 M [Bmim][Br] | 51.6 | 62.93 | 4.41 | 1.20 |
| 0.6 M [Bmim][Br] | 49.1 | 64.67 | 4.34 | 1.31 |
| 0.025 M[Bmim][I] | 52.3 | 57.82 | 4.10 | 1.09 |
| 0.05 M[Bmim][I] | 52.2 | 66.39 | 4.71 | 1.26 |
| 0.1 M[Bmim][I] | 52.1 | 57.18 | 4.05 | 1.09 |
| 0.2 M[Bmim][I] | 50.6 | 97.70 | 5.74 | 1.92 |
| 0.3 M[Bmim][I] | 49.3 | 66.08 | 4.45 | 1.33 |
| 0.4 M[Bmim][I] | 45.6 | 67.44 | 4.23 | 1.48 |
| 0.6 M[Bmim][I] | 44.5 | 54.48 | 3.35 | 1.23 |
| 0.025 M [Bmim][Br] + 0.1 M [Bmim][I] | 52.3 | 61.97 | 4.36 | 1.18 |
| 0.025 M [Bmim][Br] + 0.2 M [Bmim][I] | 50.6 | 64.71 | 4.46 | 1.27 |
| 0.025 M [Bmim][Br] + 0.3 M [Bmim][I] | 48.2 | 65.50 | 4.48 | 1.31 |
| 0.025 M [Bmim][Br] + | 47.4 | 88.32 | 5.75 | 1.86 |

| | | | | |
|---|---|---|---|---|
| 0.4 M [Bmim][I] | | | | |
| 0.05 M [Bmim][Br] + | 51.1 | 83.64 | 5.82 | 1.63 |
| 0.1 M [Bmim][I] | | | | |
| 0.05 M [Bmim][Br] + | 49.5 | 64.98 | 4.39 | 1.31 |
| 0.2 M [Bmim][I] | | | | |
| 0.05 M [Bmim][Br] + | 48.5 | 69.71 | 4.63 | 1.43 |
| 0.3 M [Bmim][I] | | | | |
| 0.05 M [Bmim][Br] + | 46.6 | 70.84 | 4.54 | 1.52 |
| 0.4 M [Bmim][I] | | | | |
| 0.1 M [Bmim][Br] + | 51.1 | 62.55 | | |
| 0.1 M [Bmim][I] | | | 4.35 | 1.21 |
| 0.1 M [Bmim][Br] + | 49.6 | 62.46 | | |
| 0.2 M [Bmim][I] | | | 4.23 | 1.25 |
| 0.1 M [Bmim][Br] + | 47.7 | 67.16 | | |
| 0.3 M [Bmim][I] | | | 4.39 | 1.40 |
| 0.1 M [Bmim][Br] + | 45.8 | 67.44 | | |
| 0.4 M [Bmim][I] | | | 4.19 | 1.49 |
| 0.2 M [Bmim][Br] + | 51.1 | 67.88 | | |
| 0.1 M [Bmim][I] | | | 4.72 | 1.32 |
| 0.2 M [Bmim][Br] + | 49.2 | 69.53 | | |
| 0.2 M [Bmim][I] | | | 4.68 | 1.41 |
| 0.2 M [Bmim][Br] + | 47.2 | 69.66 | | |
| 0.3 M [Bmim][I] | | | 4.51 | 1.47 |
| 0.2 M [Bmim][Br] + | 45.3 | 64.89 | | |
| 0.4 M [Bmim][I] | | | 4.05 | 1.43 |

[a]Each Value is the average over three measurements. The error in $T_m$ doesnot exceeds 0.1°C. The estimated relative uncertainties in ($\Delta H$), ($\Delta C_p$) and ($\Delta G_u$) are around 2% of the reported values.