Review of: "High seebeck coefficient in middle-temperature thermocell with deep eutectic solvent"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

This is a study which describes obtaining a high Seebeck co-efficient (S_e) of a $[Fe(CN)_6]^{4-/3-}$ thermocell, which utilizes DES ethaline as an electrolyte. The authors have proved that using the DES Choline chloride-ethylene glycol has increased the efficiency of the thermocell by increasing S_e, the Seebeck co-efficient which in turn depends on the redox reaction entropy. The large entropy change during the reaction in thermocell is described due to interactions of the $[Fe(CN)_6]^{4-/3-}$ with the DES. The results here add to the development of thermocells.

However, it would be nice if the following points are looked into:

1. The authors seem to have used only one type of DES namely ChCl-EG (ethaline), however the title seems to be general and so a comparative study with few other DES would be useful.
2. Will the hydrogen bond donor component and viscosity of DES affect the S_e value?
3. It is well-known that the stretching frequency of a nitrile group (CN) is sensitive to its environment. It is reported in literature earlier that a frequency of around 2224 cm^{-1} is observed for CN group in water and this value undergoes blue shift as the H-bonding with CN increases (Zhang et. al. Phys Chem Chem Phys. 2016 Mar 14; 18(10): 7027–7034). The larger difference in FWHM value denotes the greater interaction with ChCl-EG compared to water, however the exact value of the CN stretch in EG is not mentioned to be compared with water and there is no literature support provided to say that H-bonding happens more readily in ChCl-EG compared to water.
4. What is the reason for greater concentration dependency of S_e in ethaline thermocell than in aqueous thermocell?