Synthesis and modification of the structure of the ionic liquids to optimize their thermoelectric properties

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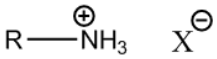
Ionic Liquids (IL) are organic salts with melting temperature typically below 100 °C. The unique properties of ionic liquids such as their excellent chemical and thermal stabilities (e.g. tetraethylammonium tetrafluoroborate can be heated up to 745°C [1].), their low vapor pressure, their important ionic conductivity makes them interesting compounds in material science and especially in thermoelectric generators (TEGs) for medical, pharma or electronic applications [2].



R = Me, Et, Pr, Bu
$X^- = NO_3^-, BF_4^-, CF_3COO^-$

Figure 1. Ammonium-base IL synthetised in this work

In our work, we describe the synthesis, physical, and thermo-electrochemical characterization of novel IL for application in thermoelectric generators (TEGs). We discuss the optimization of the chemical structure of IL regarding their thermoelectric properties via a structure-activity relationship approach [3].
The thermal stability of ionic liquids was investigated using thermogravimetric analysis (Figure 2) in order to do a scale up of the synthesis of these ionic liquids.

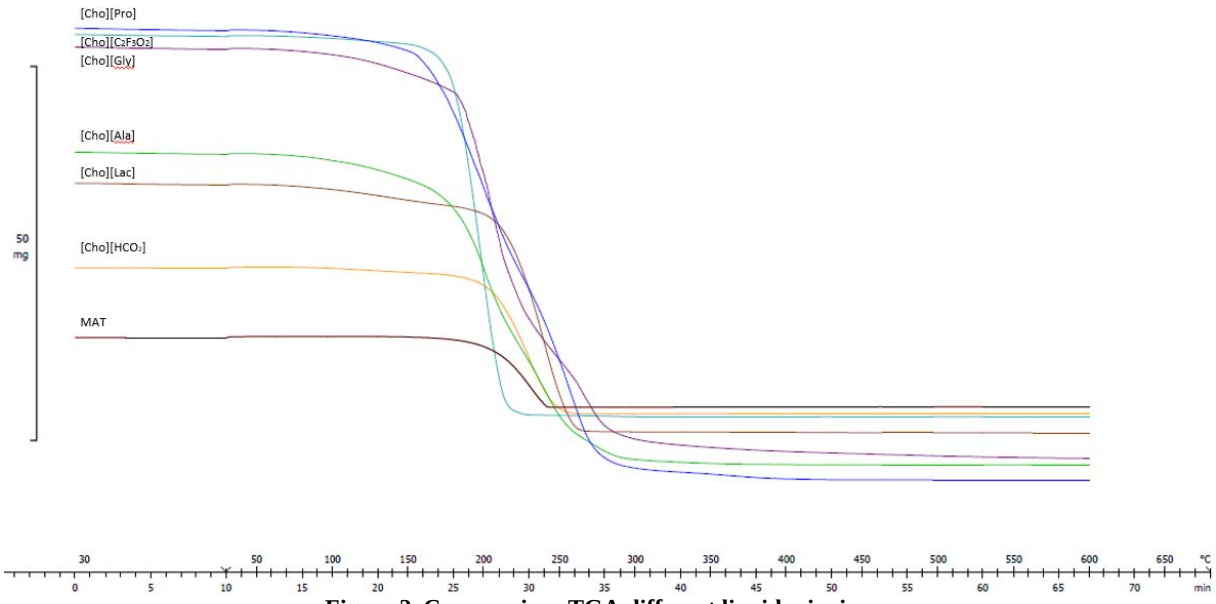


Figure 2. Comparaison TGA different liquides ioniques

References:

1. Park, D., et al., *Thermal and Electrical Conduction of Single-crystal Bi2Te3 Nanostructures grown using a one step process.* Scientific Reports, 2016. **6**.
2. Hapiot, P. and C. Lagrost, *Electrochemical reactivity in room-temperature ionic liquids.* Chemical Reviews, 2008. **108**(7): p. 2238-2264.
3. Siddique, T.A., et al., *Synthesis and characterization of protic ionic liquids as thermoelectrochemical materials.* RSC Advances, 2016. **6**(22): p. 18266-18278.