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. tetrathylammonium tetrafluoroborate can be heated up to 745°C \cite{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 \cite{2}.

\[ R = \text{Me, Et, Pr, Bu} \]
\[ X^- = \text{NO}_3^-, \text{BF}_4^-, \text{CF}_3\text{COO}^- \]

\textbf{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 \cite{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.

\textbf{Figure 2.} Comparaison TGA different liquides ioniques

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