

NOVEL IONIC CONDUCTORS: SYNTHETIC APPROACHES TO BORANATE IONIC LIQUIDS (BILs)

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Abstract text

Ionic Liquids (ILs) are considered as promising ion-conductors for batteries owing to their non-volatility and thermal stability (1). Furthermore, It has been shown that due to the large size and quasi-spherical shape of closo-boranes, as $(B_{12}H_{12}^{2-})$, the mobility of cations, Li^+ and Na^+ for instance, is increased (2).

To design Boranate Ionic Liquids (BILs), It has been chosen to use metal borohydrides $M(BH_4)_n$ as precursors to obtain BILs. In fact, some advantages are related to $M(BH_4)_n$. For instance, sodium borohydride ($NaBH_4$) is cheap and available. Moreover, they can be used to prepare bi or tri metallic boron compounds. Finally, BH_4^- is a precursor to prepare octahydrotriborate $B_3H_8^-$ anion, which could be seen as an intermediate for $B_{12}H_{12}ILs$ preparation (3).

The purpose of this work is to develop new synthetic methods to produce BILs based on dodecahydro-closo-dodecaborate ($B_{12}H_{12}^{2-}$) anion, which can be used as an electrolyte for electrochemical storage systems (4) by looking for the optimal conditions for the synthesis on large scale and finding ideal reagents to convert BH_4^- salts into $B_3H_8^-$ salts, which could be a step to reach salts of $B_{12}H_{12}^{2-}$. Characterization and understanding of the reaction mechanism for BILs syntheses are, as well, part of this project.

References

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Angelina Gigante was born in 1988 in Polla, Salerno, Italy. In 2013 she obtained her M.S. Degree in Chemistry Cum Laude under the supervision of Professor Robertino Zandoni at the University La Sapienza of Rome, Italy. Currently, she is a PhD Student in the research group of Professor Hans Hagemann at the University of Geneva, Switzerland, where she is working on the synthesis and characterization of Ionic Liquids based on closo-boranes for electrochemical storage systems.