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# Stability study of MOF@IL composite materials

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Metal-organic frameworks (MOF) offer unique advantages for many applications due to their ordered structures, high thermal stability, tunable chemical functionality, ultra-high porosity and the availability of hundreds of well characterized structures.[1] On the other hand, Ionic Liquids (IL), which are ionic salts liquid at ambient conditions, have suitable properties for many applications, such as negligible volatility, non-flammability, high thermal and chemical stability, and high ionic conductivity. However, their liquid nature hinders their handling, making it necessary the use solid supports. [2] The insertion of ILs into MOFs has resulted in a new generation of materials with properties of both MOF and IL. [3] The studies of potential applications of MOF@IL composite materials are still very incipient, but they point out that the properties of MOFs could be improved by the insertion of ILs.[4] In order to know whether MOF@IL could be used as new materials it is necessary to study their stability, both thermal and chemical.

In this work, three MOFs were selected, CuBTC, ZIF-8 and MOF-74,[5] to produce MOF@IL with two ILs, [BMIM][$BF_4$] and [EMIM][$BF_4$]. Themogravimetry was used to determine the thermal stability of the composites, as well as, to quantify the IL content before and after the leakeage tests both in water and toluene. Other characterization techniques, such as, IR spectroscopy and X-ray powder diffraction were used.

The insertion of ILs was successful for CuBTC and ZIF-8, but not for MOF-74. The thermal stability of the MOF@IL is related to the interactions established between thet MOF and the IL. However, the chemical stability of the composites in water and toluene depend on that of the MOFs and, consequently, a poor stability is observed for CuBTC@IL in water. The use of these new materials is, therefore, determined by the stability of the MOFs acting as host structures.

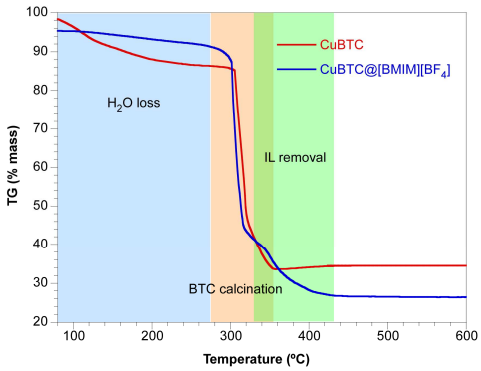


Fig.1. Thermogravimetry of CuBTC, red, and CuBTC@[BMIM][$BF_4$].

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