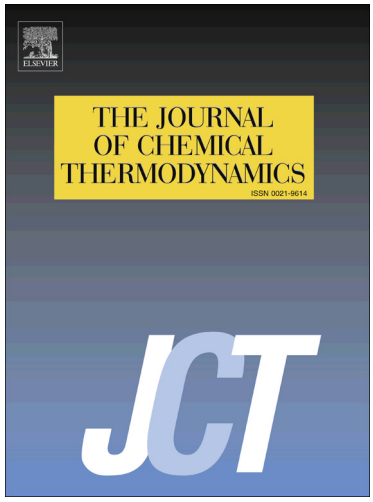

Thermochemistry of the simplest metal organic frameworks: Formates $[M(HCOO)_2]\cdot xH_2O$ (M = Li, Mg, Mn, Co, Ni, and Zn)

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Thermochemistry of the simplest metal organic frameworks: Formates $[M(HCOO)_2]\cdot xH_2O$ (M = Li, Mg, Mn, Co, Ni, and Zn)

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Abstract

The simplest organic-inorganic hybrid material, with the smallest organic moiety, is a metal formate with divalent cations connected by formate anions. These metal formates have shown enormous potential for applications, particularly in gas storage and recently as anodes in lithium ion battery materials. Since formic acid is produced industrially on a large scale, metal formates could become very significant from an economic point of view. We report the enthalpies of formation of this important class of materials, measured using acid solution calorimetry. The formation enthalpies calculated from the respective metal chlorides/oxides and formic acid are negative for all the samples, with the energetic stability decreasing in the order Mg > Zn > Mn > Co > Ni > Li. Thus these materials show thermodynamic stability with respect to their oxides and should persist for long times when used in applications/devices.

Key words: Metal Formates, Acid solution calorimetry, Formation Enthalpy, LIB, Anode materials