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Indium Based Metal-Organic Frameworks: The Search for a powerful Green Catalyst

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The reduction in negative environment impact is a primary goal in the chemical industry. For these reasons several authors, looking for a “green chemistry”, highlighted the special interest in using indium for its diverse physical properties and its stability in air.[1] Our interest is focused on indium MOFs constructed with benzene multicarboxylate ligands, which have been found to be useful building blocks in construction of MOF materials. This approach has allowed the assembly of indium based structures with catalytic activity toward nitroaromatics reduction, sulfide oxidation, aldehydes acetalization and aldehydes cyanosilylation.[2-3] In this way, we have synthesized, purified and characterized five new indium based MOFs using 4,4'-hexafluoroisopropylidene-bis-(benzoic acid) (H₂hfipbb) as bent organic linker together with N-donor ancillary ligands, which gave rise to materials with the composition [In(OH)(hfipbb)] (1), [In₂(hfipbb)₃(1,10-phen)₂]•2H₂O (2), [In₂(hfipbb)₃(2,2'-bipy)₂]•2H₂O (3), [In₂(hfipbb)₃(4,4'-bipy)] (4) and [In₄(OH)₄(hfipbb)₄(4,4'-bipy)] (5). Taking to account the Lewis acidity properties that these compounds could present, 1-5 were tested in the cyanosilylation reaction (CSR) of aldehydes and ketones.

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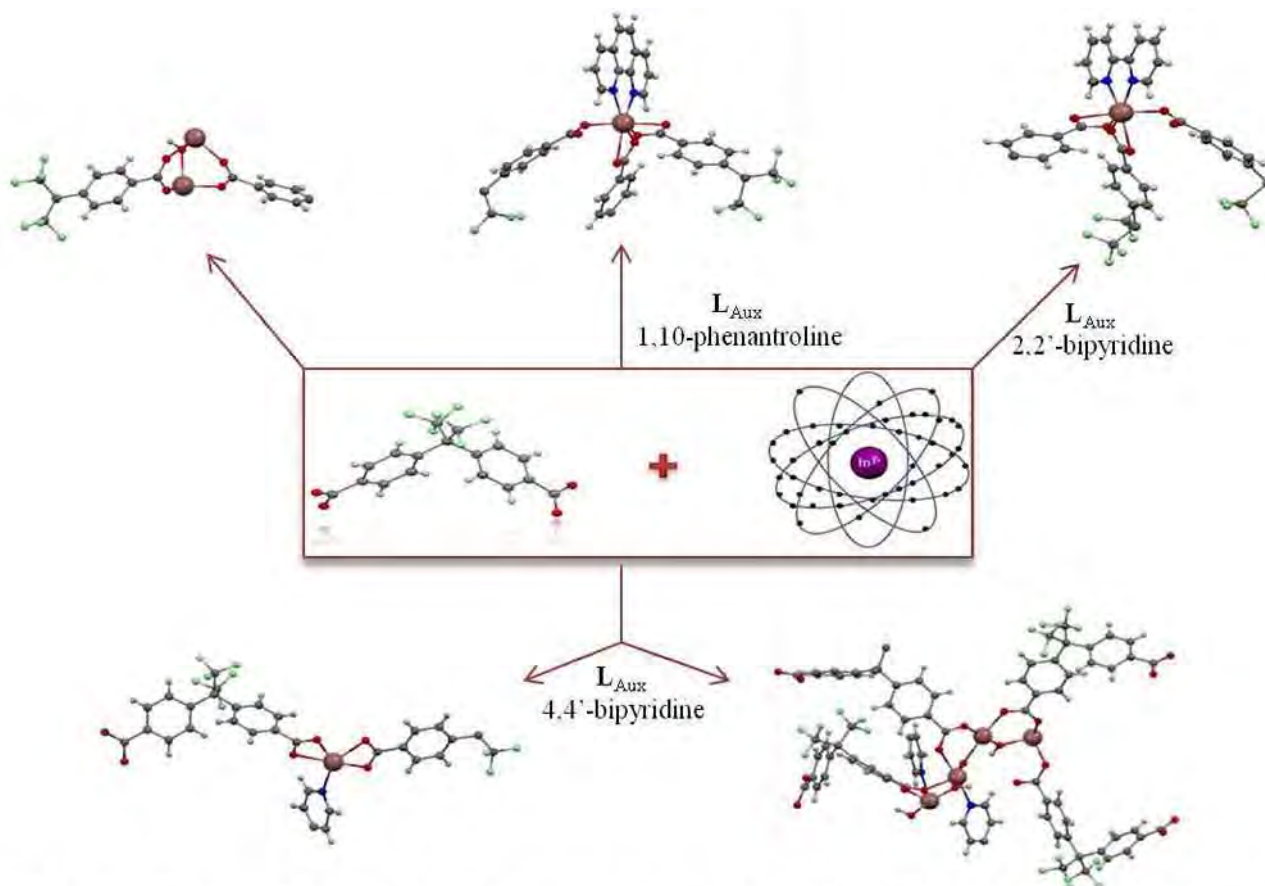


Figure 1. Five new different Indium MOFs obtained with the flexible ligand H₂hfipbb without and with additional ligands.

Keywords: Indium compounds, metal-organic frameworks, Heterogeneous catalysis