AFFORDABLE SOLUTIONS FOR ASYMMETRIC REDUCTIONS OF INDUSTRIALLY RELEVANT SUBSTRATES

From 2012-10-01 to 2016-09-30, closed project

Project details

<table>
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<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
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<tbody>
<tr>
<td>EUR 487,774.06</td>
<td>FP7-PEOPLE-2012-ITN - Marie-Curie Action: &quot;Initial Training Networks&quot;</td>
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<tr>
<th>EU contribution:</th>
<th>Call for proposal:</th>
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<th>Coordinated in:</th>
<th>Funding scheme:</th>
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<td>Italy</td>
<td>MC-ITN - Networks for Initial Training (ITN)</td>
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Objective

A number of methods exist for the production of enantiopure pharma intermediates. Among them, classical resolution by crystallization is the least efficient and most used one, while asymmetric catalysis, arguably the most efficient, is much less used. This paradox is due to a number of factors, such as: 1. High cost of the catalyst. 2. Lack of scope. 3. Time-to-market pressure. In this project we will investigate solutions to problems 1 and 2. We will develop new chiral catalysts for asymmetric double bond reduction that contain first-row base metals (e.g. Fe, Cu, Co, Ni). These metals are remarkably cheaper than their second and third-row noble metal counterparts (e.g. Ru, Rh, Ir, Pd, Pt). The chiral ligands should form strong bonds with these base metals in order to prevent the disabling metathesis of the complexes. In these complexes, we will also explore the use of “non-innocent” ligands which can participate in the transfer of electrons. The chiral ligands should be ideally produced in a few steps at low cost. According to a combinatorial approach, we will use libraries of ligands and of metal sources, so that the best hit can be rapidly identified. The second problem we want to address is the enantioselective reduction of pyridines, that so far have defied attempts at their asymmetric reduction to 2- or 3-substituted piperidines, which are important pharma intermediates. Disturbing the aromaticity of the pyridines via quaternization, or via binding to a metal surface or via eta6-binding to another metal complex will activate them for asymmetric reduction via catalytic hydrogenation or transfer hydrogenation. Our aim is to train two PhD researchers aware of the importance of sustainability issues (use of readily available metals, study of life cycle analysis assessment, carbon footprint evaluation) as well as expert in the use and combination of different catalytic methodologies as important tools for the responsible production of commodity and fine chemicals.

Related information

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<th>Result In Brief</th>
<th>Cheaper and more sustainable catalysts</th>
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<td>Report Summaries</td>
<td>Final Report Summary - REDUCTO (AFFORDABLE SOLUTIONS FOR ASYMMETRIC REDUCTIONS OF INDUSTRIALLY RELEVANT SUBSTRATES)</td>
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Coordinator

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EU contribution: EUR 466,328,09

Activity type: Higher or Secondary Education Establishments

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EU contribution: EUR 21,445,97

Activity type: Private for-profit entities (excluding Higher or Secondary Education Establishments)

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Subjects

Life Sciences

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