



Expanding the Industrial Use of Robust Oxidative Biocatalysts for the Conversion and Production of Alcohols

The **ROBOX** project has now been active for eighteen months and has been developing better chemical manufacturing processes by replacing conventional chemistry, chemical catalysts and solvents in the processes used by new biocatalysts that can be utilised in benign water based operations. A catalyst is a substance that speeds up a chemical reaction and without the catalyst a reaction might not work at all or be so inefficient that the process for making a chemical is not economically viable. An example of biocatalysts working in our body is digestion of food and energy production both relying on cascades of biocatalysts. Biocatalytic processes applied in the chemical and pharmaceutical industry involve different enzymes such as the so called alcohol dehydrogenases (ADH) and cytochrome P450s being used to oxidise substrates. These enzymes (or modified versions of these enzymes) are useful catalysts in the production of a large range of chemical compounds required by consumers including many used in pharmaceuticals, cosmetics and other healthcare products.

The **ROBOX** project is divided into several scientific subjects (called work-packages in European Union Commission language) and it is run by leading scientists in Europe collaborating in several areas across the whole technology supply chain which allows real progress to be made. This will enable **ROBOX** to deliver benefits to society of cleaner and safer manufacture of consumer products essential for healthy living.

The Science and Innovation in ROBOX

The first of these scientific subjects is enzyme (or biocatalyst) redesign led by scientists from Groningen, the Netherlands delivering robust enzymes by using state-of-the art IT computer design methodologies for predicting beneficial mutations, creating mutant libraries and developing effective screening methods to identify improved enzymes with the desired properties.

Next in the chain comes fermentation scientists led by experts from Graz, Austria who are developing methods to produce these enzymes in mild fermentation processes without using precious resources such as rare and expensive metals which is one problem with traditional chemical catalytic methods now used.

These catalysts are now designed into processes that are validated in small pilot scale studies of the biocatalytic reactions led by the team in Barcelona, Spain.

The demonstration of the bio-oxidation enzymes and biocatalytic oxidation reactions is then implemented by the company partners that include members from the Netherlands, Germany, Belgium, Switzerland and the Czech Republic testing these methods to make real commercial products.

Finally experts from Denmark lead the analysis and evaluation of the methods developed to demonstrate the advantages claimed are scientifically validated using best techniques for impacts such as carbon footprints and life cycle analysis. These will then be published for wider scrutiny by scientists and society. Coupled with the countries mentioned experts from Italy and the United Kingdom complete the team and show this project is a truly European collaboration leading innovation progress in this industry.

The **ROBOX** project has already led to identification of new possible production routes and patent applications are currently being drawn up with more are under consideration.



Further information can be found on the projects public website www.h2020ROBOX.eu, where you can find more on the different work packages and newsletters.

“The ROBOX project has received funding from the European Union (EU) project ROBOX (grant agreement n° 635734) under EU’s Horizon 2020 Programme Research and Innovation actions H2020-LEIT- BIO-2014-1”.



Programme co-funded by the
EUROPEAN UNION