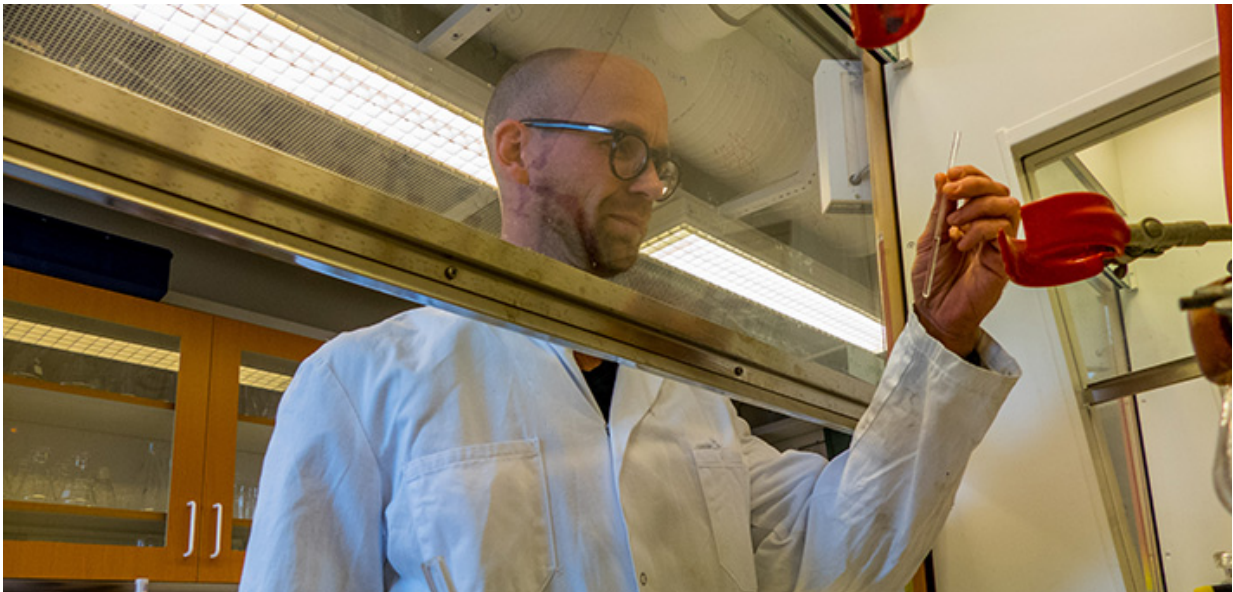


# New method makes oxygen a raw material for carbon-based substances

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Assistant Professor Henrik Sundén and his team, Linda Ta and Anton Axelsson, at the Chemistry and Biochemistry division, at Chalmers, shows how it is possible to change complex and ineffective oxidants for oxygen. This way a number of carbon-based molecules, for instance two active ingredients in sunscreen, can be produced. The results are published in the next edition of the journal *Green Chemistry*.

By combining three different catalytic processes where electrons are

moved in a set path, the team has managed to connect aldehydes with alcohols, both carbon-based [compounds](#), by using oxygen. This way they have managed to create new [carbon compounds](#), with water as the only byproduct.

"We have developed a catalytic [method](#) to use oxygen directly from the air as a raw material in an organic synthesis of fine chemicals. Using oxygen from the air is very desirable since it doesn't cost anything. Three of the molecules we can produce this way is today used in different sorts of sun protection. Two of them, amiloxate and octinoxate, are very common in sunscreen," Henrik Sundén says.

One advantage with connecting three different catalytic systems is that ineffective and high molecular oxidants may be replaced with oxygen which leads to better atom economy, and a more sustainable process environmentally. It may also be of economic benefit in production of many different carbon compounds. The three solar absorbent molecules are examples of what can be accomplished with the new method. The article shows a total of 20 molecules that the team has produced, but this is merely a selection of what the method can be used for.

"We don't know what the current production cost are for these solar absorbent compounds, but since [oxygen](#) is free and the method may be used in large scale we are pretty sure that our discovery may lead to a lower production cost. The method, except from lowering the costs, may also enable a reduction of chemical waste from production," Henrik Sundén says.

Provided by Chalmers University of Technology

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