



## A biocatalytic route to C-nucleosides

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Did you know that C-nucleosides are essential constituents of modern mRNA vaccines? Were you aware that, up until now, there have been limited options for efficient chemical syntheses? acib changed all that with its recent work (published in Nat.Commun).

**AVAILABLE FOR:**

- Joint Research Project
- Contract Research
- Investments

**DEVELOPMENT STATUS:**  
Technology Readiness Level 4  
(Technology validated in Lab)

### BACKGROUND

The pharmaceutical industry is experiencing a steady increase in demand for C-nucleosides. These valuable compounds serve as essential building blocks for the development of anti-viral agents like remdesivir and anti-tumor treatments. Moreover, the substitution of uracil with the C-nucleoside pseudouridine in mRNA vaccines has been proven effective in enhancing translation efficiency and reducing the immunogenic response to synthetic RNA. Consequently, these modifications have become commonplace in modern mRNA vaccines. However, accessing C-nucleosides and their derivatives has been challenging thus far. Conventional chemical synthesis methods suffer from low reaction efficiencies, requiring cryogenic conditions, the use of protective groups, and toxic chemicals, which results in an expensive and unsustainable process.

Fortunately, our technology offers a solution to overcome these obstacles, providing a promising opportunity for cost-effective and efficient industrial production of this class of substances.

**IPR (OPTIONAL):**  
Will be generated for you as our industrial partner/our client

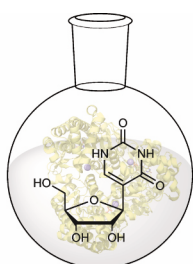
**KEYWORDS:**  
Biocatalysis  
C-nucleoside  
One-pot synthesis  
Pseudouridine  
mRNA vaccines

### TECHNOLOGY

For the exemplary substrate pseudouridine acib has successfully engineered a biocatalytic cascade that achieves complete conversion within 24 hours and exhibits an impressive productivity of 36 g/L/h. The final product attains a concentration of 240 g/L, and the process produces no undesirable by-products. Furthermore, the crystallization of the product  $\Psi$  during the reaction facilitates its isolation, resulting in a yield exceeding 90% and a purity surpassing 95%. Thanks to its exceptional atom efficiency and efficient isolation, the process generates minimal waste, leading to an incredibly low E factor of only 3.

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productivity 36 g/L/h  
product titer = 240 g/L  
E-factor = 3  
> 90% isolated yield  
> 95% purity

**One-pot biocatalytic  
cascade reaction**

### OFFER

acib offers to further develop and optimize pseudouridine and other C-nucleoside biocatalysis exclusively for you. IP developed in such projects can be fully transferred to you as our investor/industrial partner.