

## Sustainable biological ammonia production using microorganisms

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### Abstract:

Ammonia, with a worldwide production of 235 million tonnes is one of the main chemical commodities produced, extensively used as fertilisers with growing interest as an energy storage vector<sup>1</sup>. The conventional Haber-Bosch synthesis requires about 2-3% of total world's energy commonly derived from fossil fuels, generating disastrous effects for the environment<sup>2</sup>. To achieve a carbon-free society, among the green approaches, we propose a new biological ammonia production exploiting microorganisms and using biomasses as primary feedstock.

So far, few research reports the use of successful biological technologies for the sustainable secretion of nitrogen<sup>3</sup>. Some bacteria and yeasts have already been engineered in order to produce ammonia from biomass, respectively, by metabolic engineering<sup>4,5</sup> and by displaying an amino-acid-catabolizing enzyme on the cell surface<sup>6</sup>. In this project, we present an advanced study for ammonia production, exploiting microorganisms with an optimized metabolism for the utilization of nitrogen-rich sources aiming to increase nitrogen extracellular release. The final goal of this project will be to create a cell factory able to valorise different waste biomasses for a renewable and sustainable process.

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