

Sustainable nitrogen-based fertilizer production from sun, air, and water

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In the DüSol research project, the technology of sustainable fertilizer production is developed and demonstrated on the basis of solar thermal redox cycle processes. The focus is on the unexplored step of solar thermal air separation for the production of nitrogen. For this reaction, corresponding materials are identified by thermodynamic calculations and qualified and optimized on a laboratory scale. In combination with material development, a prototype reactor is designed based on computer-aided calculation tools. In a test campaign in the new high-performance laser SynLight at the Technology Center in Jülich, this reactor is being tested and the solar thermal nitrogen production demonstrated. These experimental works go hand in hand with the overall process simulation and optimization, which lead to a comprehensive economic analysis.