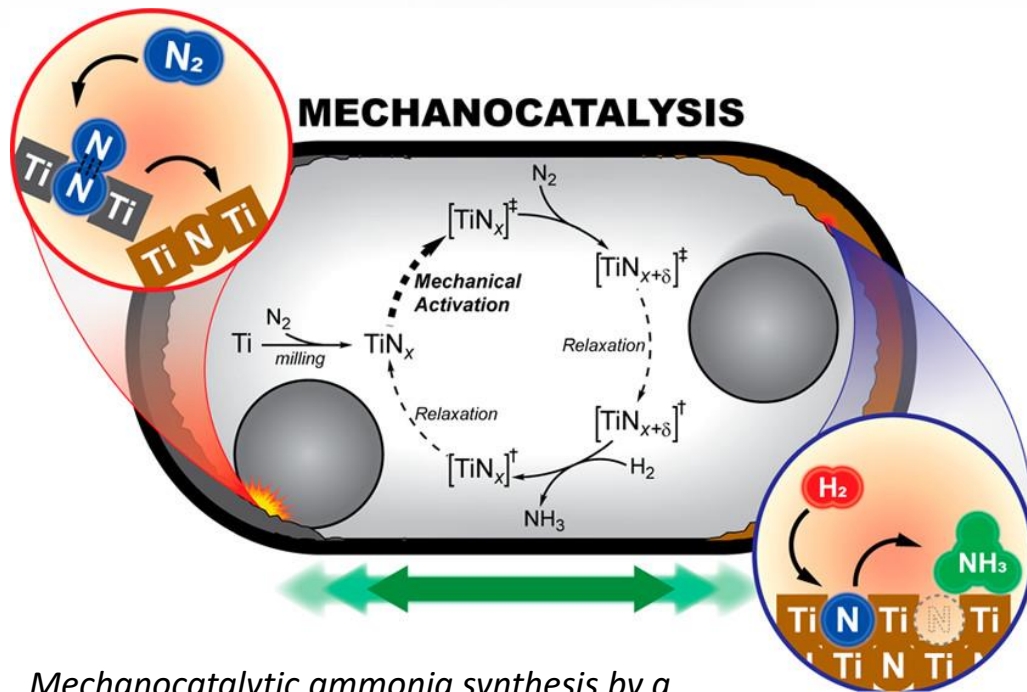


New Approach For Ammonia Production



Mechanocatalytic ammonia synthesis by a titanium catalyst in a ball mill under nitrogen and hydrogen gas flow.

Andrew W. Tricker, Karoline L. Hebisch, Marco Buchmann, Yu-Hsuan Liu, Marcus Rose, Eli Stavitski, Andrew J. Medford, Marta C. Hatzell, and Carsten Sievers. *ACS Energy Letters* 5 (11), 3362-3367 (2020).

Work was performed in part at Brookhaven National Laboratory

Scientific Achievement

Scientists show the first proof of principle for ammonia production through ball milling using a titanium nitride catalyst under nitrogen and hydrogen gas flow at room temperature.

Significance and Impact

To meet today's global food needs, fertilizers based on ammonia are key; this work offers an environmentally friendly and energy-efficient way to synthesize ammonia under ambient conditions.

Research Details

- Titanium metal is mechanochemically converted into a titanium nitride in a ball mill.
- Within the mill, titanium nitride acts as a catalyst for *in situ* ammonia synthesis.
- The reaction was characterized using x-ray absorption spectroscopy at the ISS beamline at NSLS-II.
- Results showed that the catalytic cycle is rate limited by the nitride regeneration.