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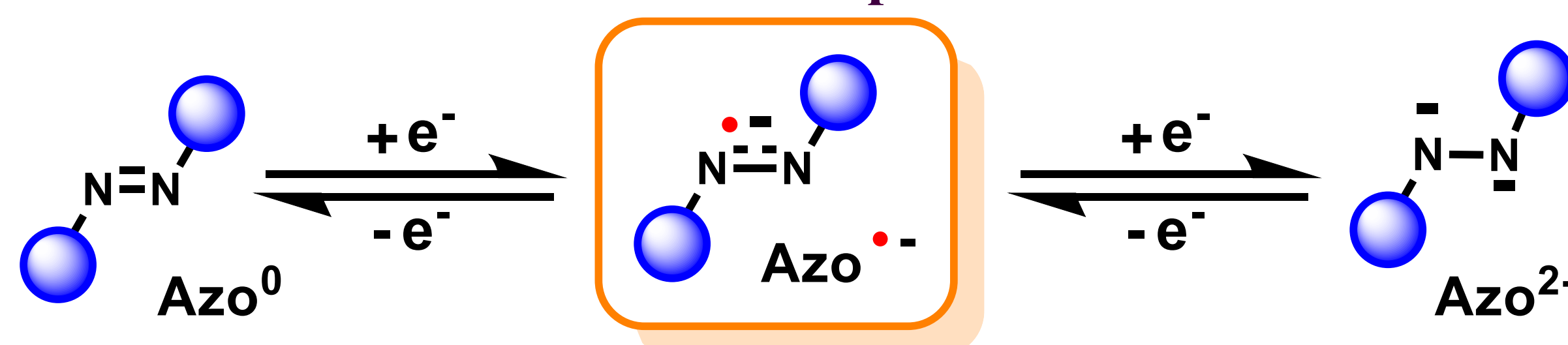
Specific objectives of the work

- ❖ We wanted to utilize **redox-active nature of the ligand efficiently to mimic $2e^-/2H^+$ redox chemistry** performed by precious metals.
- ❖ Our target is using base-metal complexes to carry out **various borrowing-hydrogen reactions via Hydrogen Atom Transfer (HAT)**.

Why redox-active ligand?

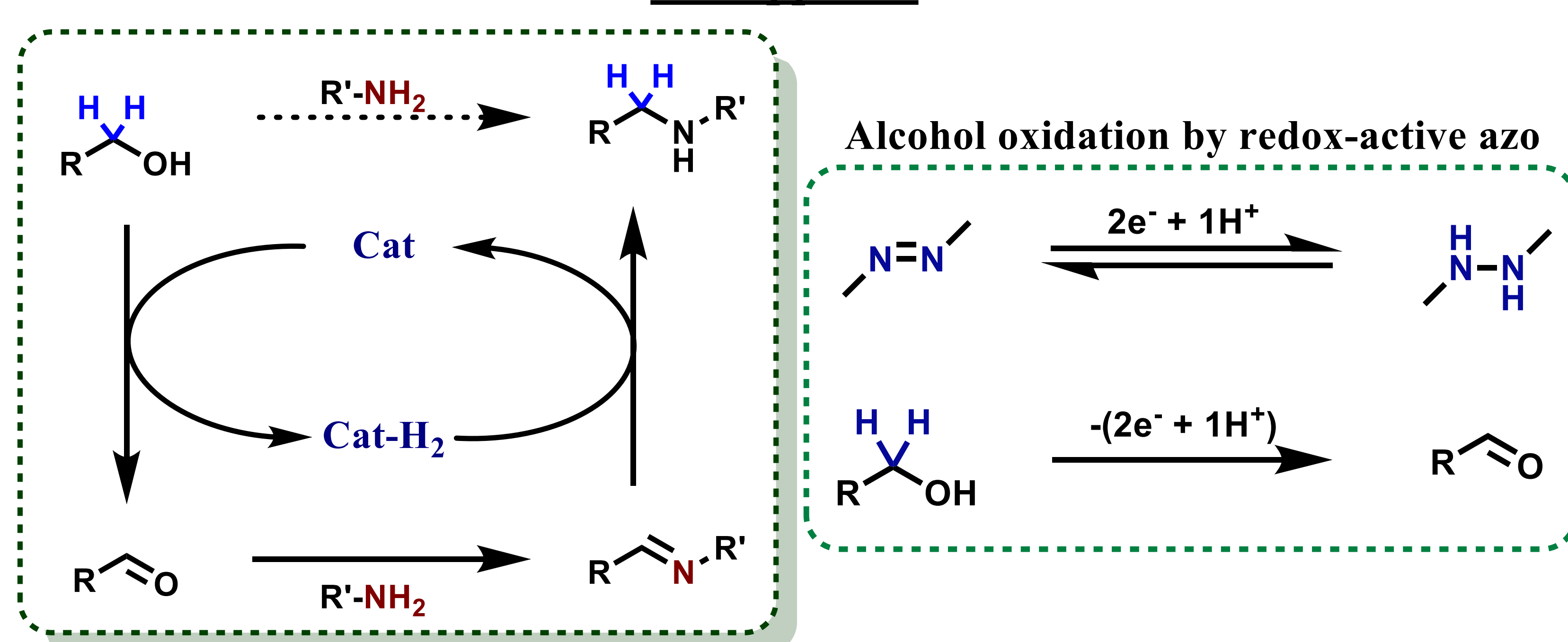
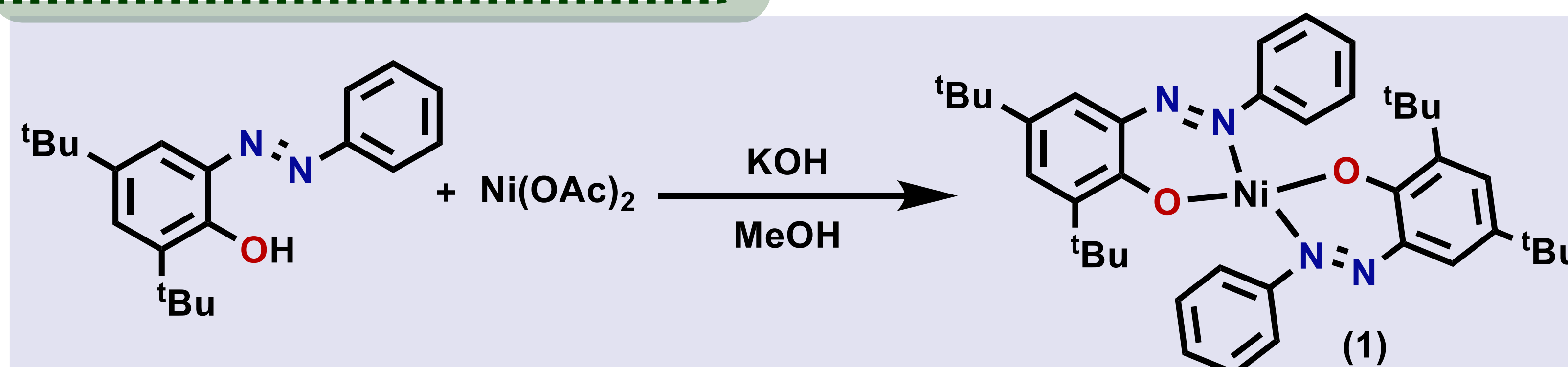
Cheap metal for noble job.

Azo-radical : active species for HAT

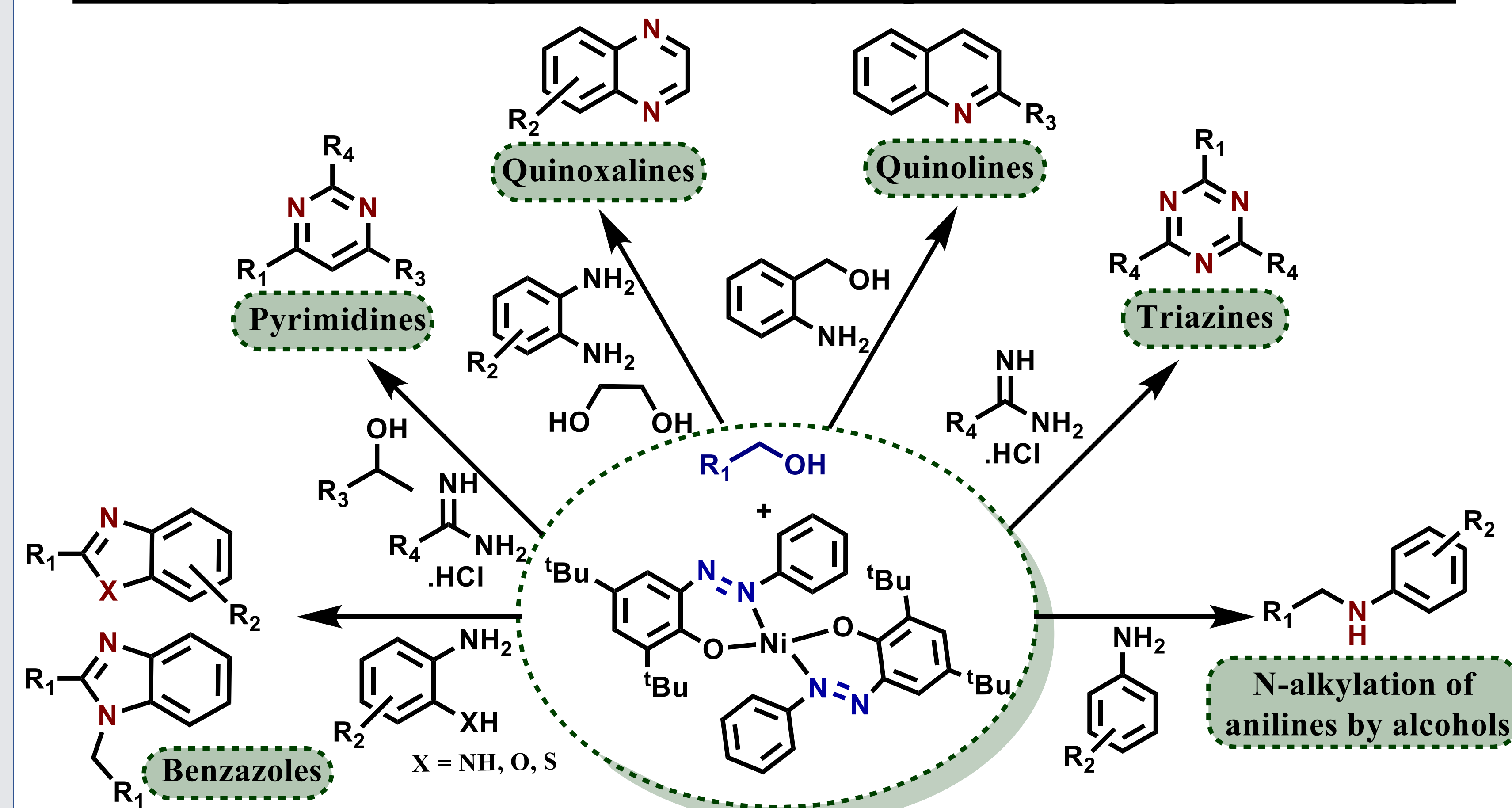


The successful combination of ligand dominated redox with 3d-metal can emulate precious metal chemistry

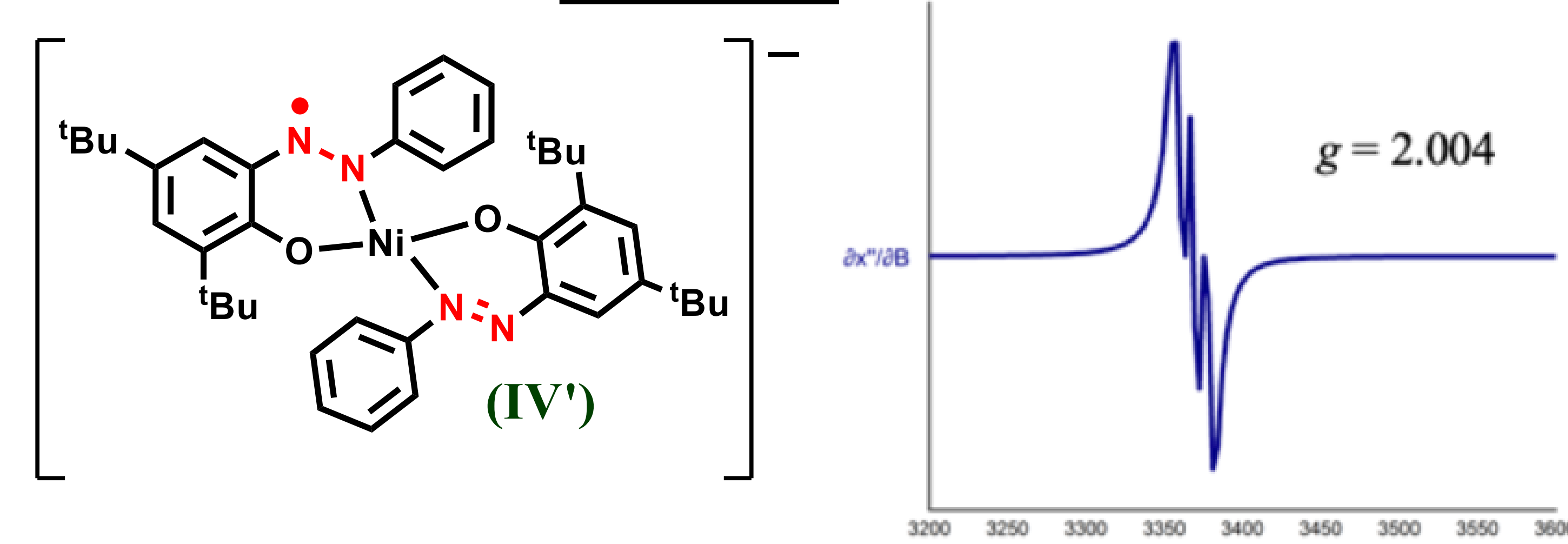
Our approach



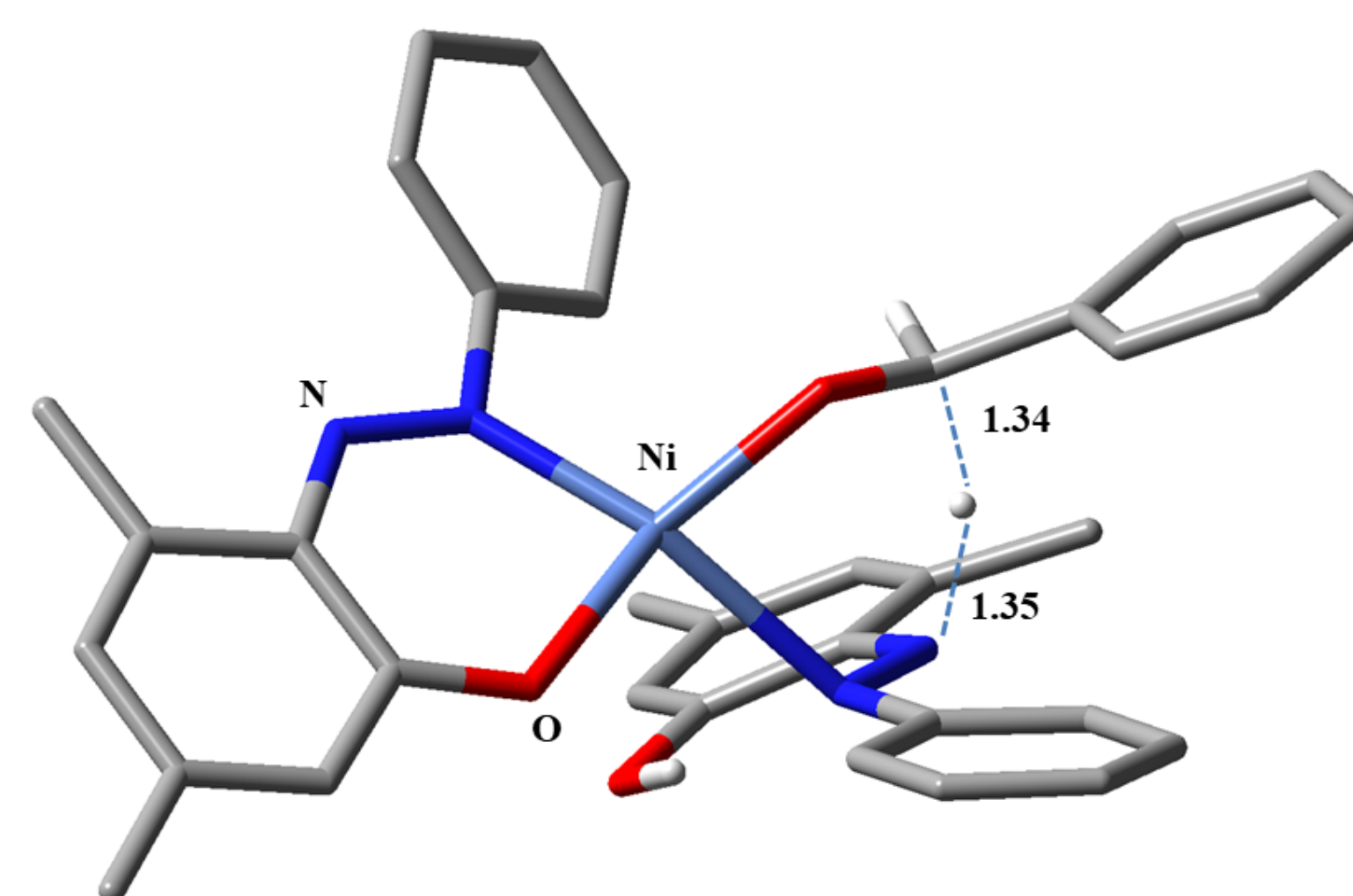
Various organic transformations via hydrogen borrowing methodology.



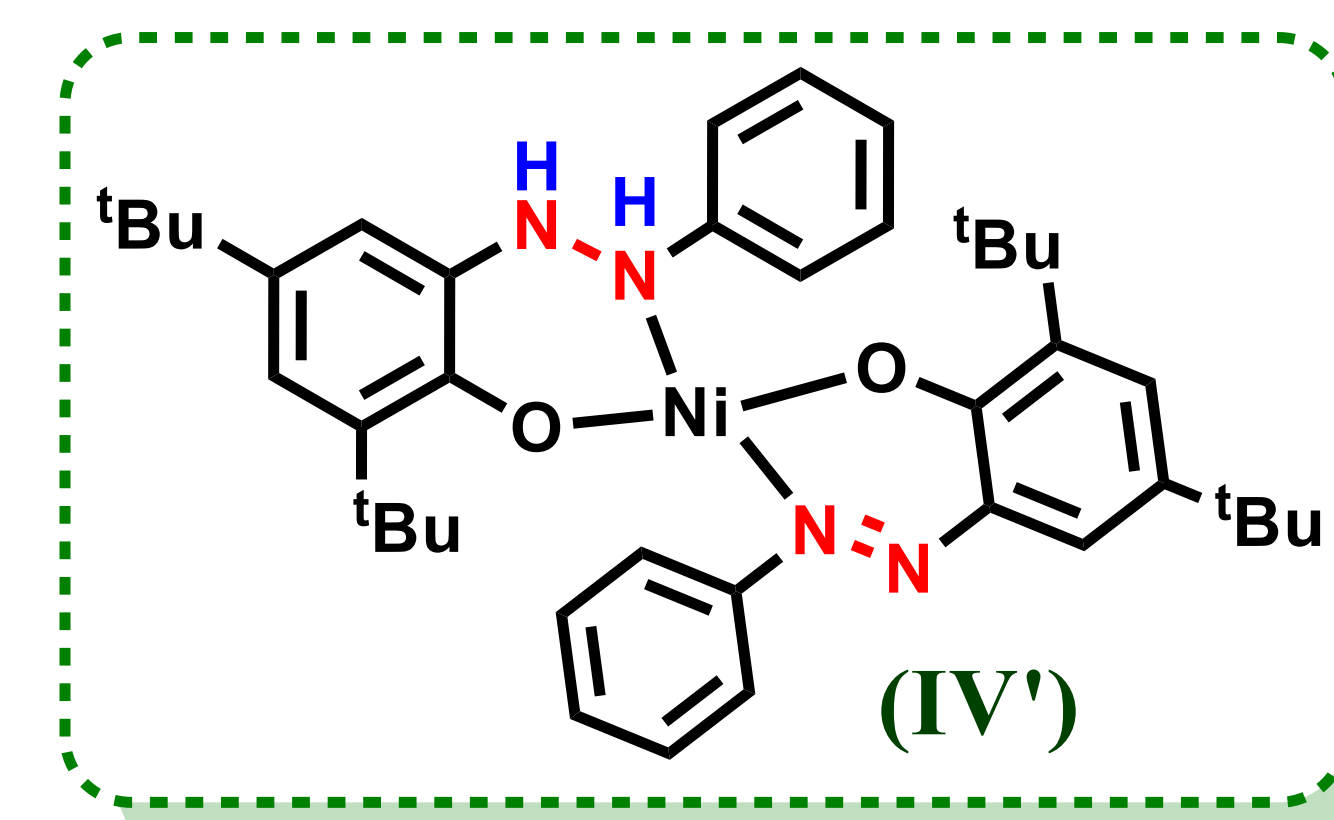
Mechanistic insight



X-band EPR signal obtained from the singly reduced catalyst

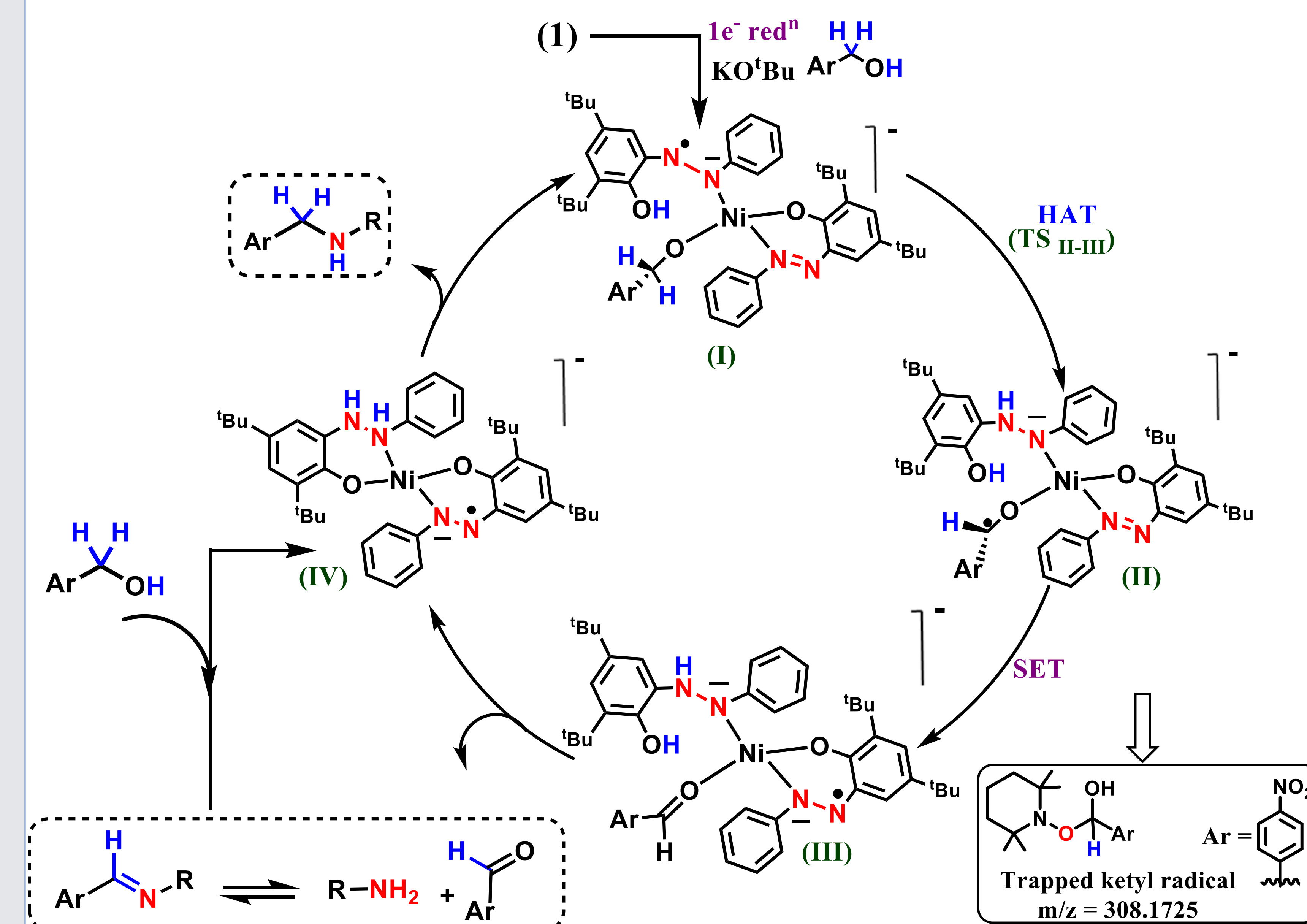
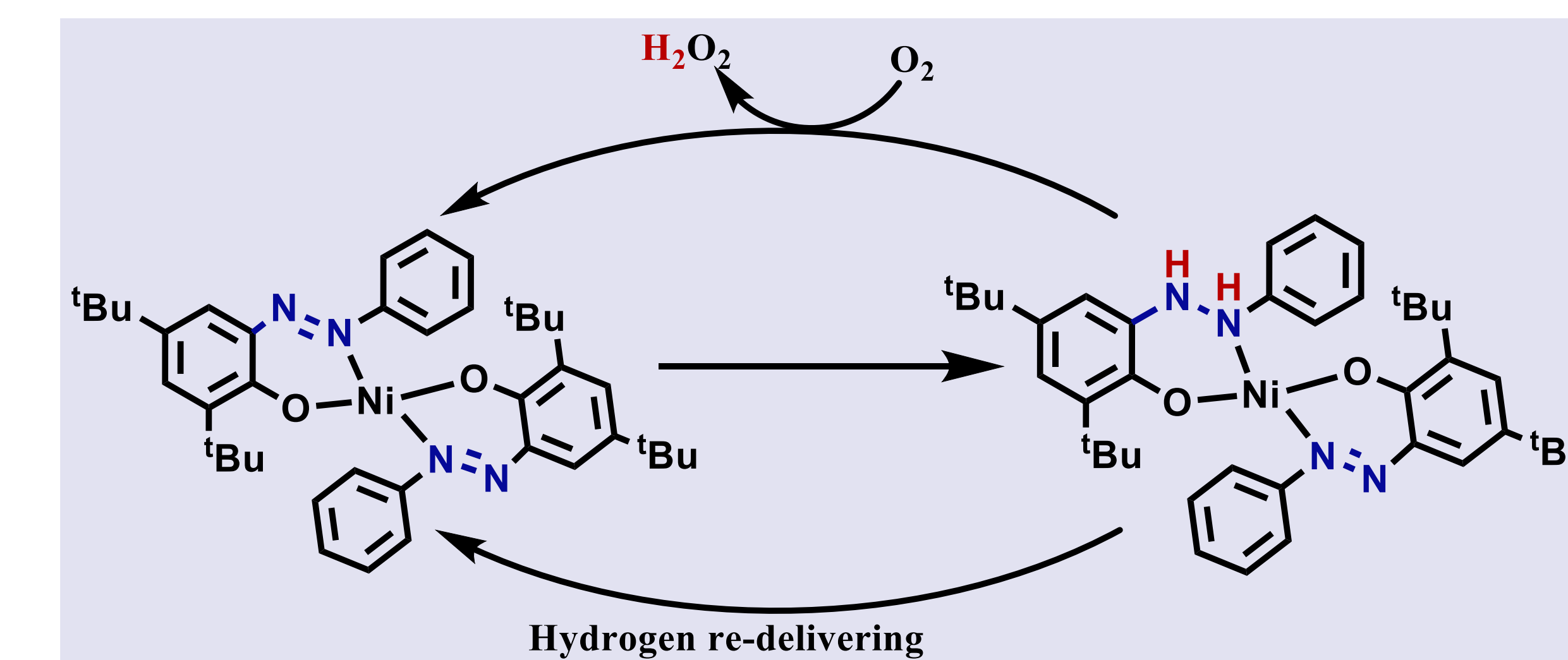


DFT optimized transition state for HAT



Isolated hydrazo moiety

Mechanism



- Single Electron Redox
- Hydrogen Atom Transfer (HAT)
- Ligand assisted redox

Bu Much milder conditions

References and acknowledgement

IISER Mohali instrumentation facility and research fellowship.; References: [1] A. K. Bains, A. Kundu, S. Yadav and D. Adhikari, *ACS Catal.*, 2019, **9**, 9051- 9059; [2] A. K. Bains, D. Dey, S. Yadav, A. Kundu and D. Adhikari, *Cat. Sci. Tech.*, 2020, **10**, 6495-6500; [3] A. K. Bains and D. Adhikari, *Cat. Sci. Tech.*, 2020, **10**, 6309-6318; [4] A. K. Bains, V. Singh and D. Adhikari, *J. Org. Chem.*, 2020, **85**, 14971–14979. [5] A. K. Bains, A. Biswas and D. Adhikari, *Chem Commun.*, **2020**, 56, 15442-15445