Catalysts for change

Driving efficiency in petrochemicals

Petrochemicals support the production of plastics, fertilizers, synthetic fibers, and more

Catalyst dependency

90%

chemical processes[1]

Economic impact

80%

of manufactured products globally[2]

Growing demand

30%

of oil demand growth by 2030[2,4]

Sustainability and emission reduction

Supporting lower-emission petrochemical processes

Catalysts help improve process efficiency, reduce emissions, and enable the use of alternative feedstocks, supporting industry efforts to reduce greenhouse gas emissions over time.

Heterogeneous catalysis in refining

The use of catalysts in hydroprocessing (e.g., ultra-deep hydrodesulfurization), has helped reduced sulfur in diesel from 5000 ppm to <10 ppm since the 1990s.[5]

Fluid catalytic cracking (FCC)

Zeolite catalysts convert heavy oil to gasoline, meeting 2045 demand while reducing waste and crude extraction, cutting environmental impact.[5,6]

Innovative ionic liquid catalysts

Developed by Chevron and Honeywell in 2021, these catalysts extend catalyst life and reduce costs, enhancing efficiency in high-octane gasoline production.[7]

Sustainable catalysts in oxidation and dehydrogenation

Used to produce essentials like plastics, fibers, and rubber, catalysts are crucial for meeting demand sustainably in this market with a projected value of $750 billion by 2028.[8]

Biodiesel via hydrogenation

Vegetable oil catalysts produce biodiesel, cutting emissions and fossil fuel use. With 2032 output at 60 billion liters, it meets rising sustainable fuel demand.[9]

CO_2 sequestration and CCUS

Catalysts in CCUS convert CO_2 into valuable products like methanol and synthetic fuels, creating a closed carbon loop that cuts greenhouse gases and boosts economic value.[10]

Syngas production

Advanced catalysts turn natural gas and biomass into key ingredients for fuels and chemicals, offering a cleaner, efficient alternative to traditional hydrocarbons.[11]

Selective catalytic reduction (SCR)

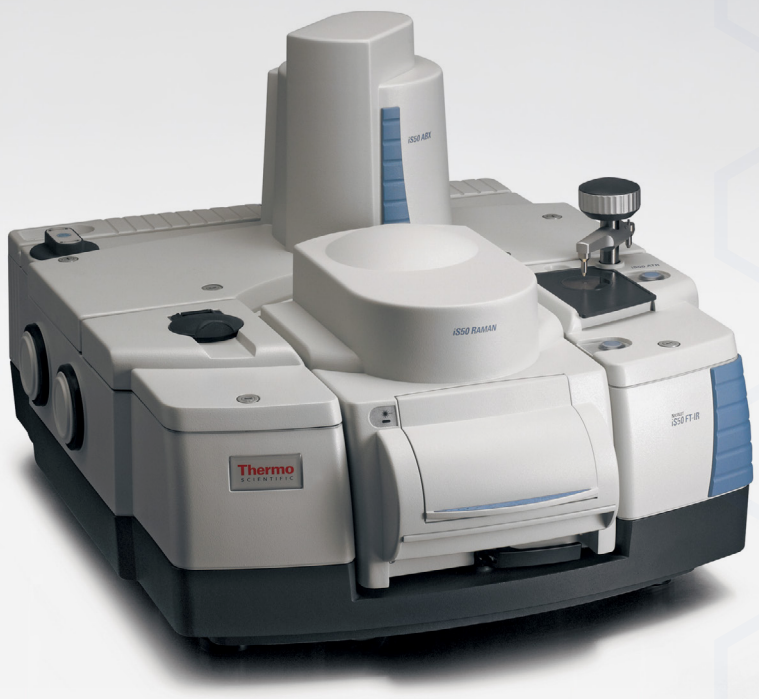
Using catalysts, this technology cuts nitrogen oxide (NO_X) emissions by up to 90%, improving air quality in power plants and diesel engines while meeting strict standards.[12]

Integrated FTIR solutions for catalyst research

Designed for catalyst characterization

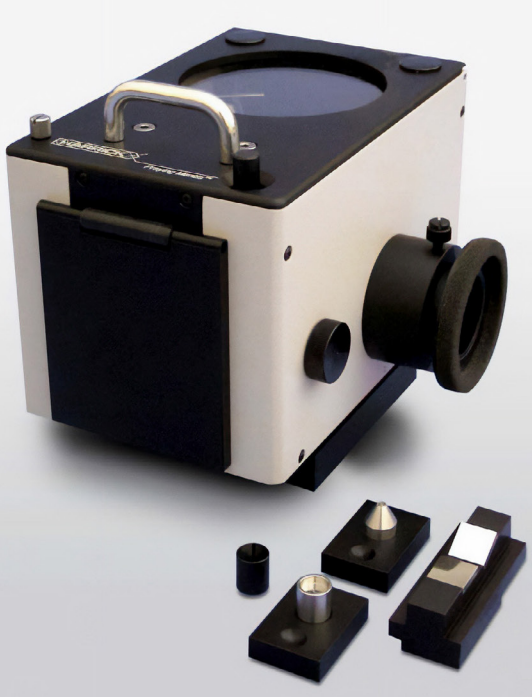
Thermo Scientific™ Nicolet™ iS50 FTIR Spectrometer

The Nicolet iS50 spectrometer provides a flexible platform for catalyst research. Combined with the Harrick Scientific™ Praying Mantis™ diffuse reflectance accessory and reaction chamber, it supports in situ DRIFTS measurements for investigating catalyst behavior under realistic reaction conditions.



Flexible analytical platform

- Configurable system supports multiple sampling techniques and detector options
- Versatile platform supports in situ studies of catalyst surface chemistry and reaction mechanisms
- Expandable platform adapts to evolving petrochemical research needs



Harrick Scientific™ Praying Mantis™

The Praying Mantis accessory is designed for diffuse reflectance measurements of catalyst powders and other solid materials. Its optical design helps maximize collection of diffusely reflected light while minimizing specular reflection.

High-temperature reaction studies

The accessory supports temperature-controlled experiments from –150°C to 910°C and pressures up to 34 bar, enabling catalyst characterization under a wide range of experimental conditions.

Temperature-programmed workflows

Harris Scientific™ Templink™ software links temperature control with spectral acquisition to automate data collection at user-defined temperature setpoints, helping improve laboratory productivity.

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