

Microbial Biotechnology Area

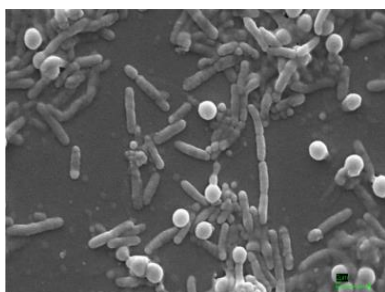
The Microbial Biotechnology Area is actively engaged in exploring sustainable solutions for protection of environment, development of innovative technologies, and alternate renewable energy production for commercial application. The Area mainly focusses on basic and industrial research, especially in the field of oil and gas sector for exploring microbial solutions towards development of Environmental Industrial Biotechnology-based programme.

Focus / Thrust Areas

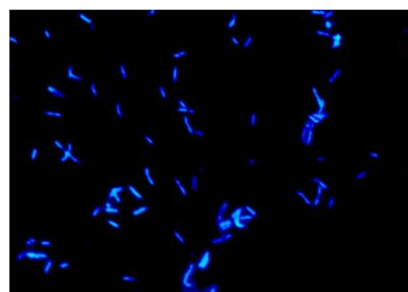
- Demonstration of microbial methane generation/enhancement from poor to marginal producing coalbed methane (CBM) wells (fields).
- Microbial enhanced oil recovery (MEOR) for enhanced oil recovery from oil reservoirs for tackling the problem of oil well stripping.
- Environmental protection for safeguarding the natural gas pipelines/ LPG pipelines for microbial induced corrosion (MIC) in oil/gas pipelines.
- Prevention of paraffin deposition in oil well tubing.
- Sequestration of CO₂ with simultaneous production of commodity chemicals.
- Metabolic engineering for industrial-scale production of commodity chemicals.
- Exploitation of metagenomics for production of biodegradable plastics.
- Development of potential probiotics from novel sources.
- Developing green corridor (plantation) on highways and greening of schools for environment sustainability
- Recombinant strain for production of enzyme.

Biotechnology for Energy

TERI has developed microbial solutions for enhanced CBM production from subsurface of CBM reservoir. Technology has been developed and tested in many CBM wells of Jharia block, which resulted in 3–4 fold increase in CBM production. Such encouraging results led us to apply this microbial stimulation technique in poorly/ and marginal/ non-producer CBM wells of Jharia and Bokaro.



Scanning microscopy of bacterial consortia



Fluorescent microscopy of bacterial consortia



Microbial enhanced oil recovery (MEOR) technology

To tackle the stripper oil well problems of oil industry, TERI developed and tested microbial solutions for enhanced oil recovery, up to 90°C of reservoir temperature. Microbial consortia metabolites in the oil wells thus increase sweep efficiency of crude oil from reservoir, which enhances oil production.

Viscosity reduction of heavy (PCT no. WO2017/077553A1)

TERI worked towards enhanced oil recovery from heavy oil reservoirs, and microbes tend to reduce the viscosity and technology has been tested in heavy oil fields of Lanwa and Becharaji.

***Bacillus* sp. for industrial-scale production of alkaline-protease**

TERI has developed a recombinant *Bacillus* strain for industrial production of protease. Economically produced purified enzyme may substitute the chemically synthesized commercially enzyme in agriculture, textile, food, detergent, and leather industries.

Conversion of Carbon dioxide into useful product

TERI has developed an economic, sustainable microbial process for carbon dioxide assimilation and conversion of CO₂ into useful product through anaerobic fermentation process. At present, research has been initiated for succinic acid production as a platform chemical used in plastics, textiles, pharmaceuticals, and solvents industries.

Developing green corridor (plantation) on highways and greening of schools for environment sustainability

As a corporate social responsibility (CSR) initiative, TERI works for green corridor development initiative with conducting outreach and awareness programmes, engaging schools, community, government organizations, and other stakeholders for environment awareness and mass movement.

Clients' List

- Department of Biotechnology, Ministry of Science and Technology
- Department of Science and Technology, Ministry of Science and Technology
- Biotechnology Industry Research Assistance Council
- Oil and Natural Gas Corporation (ONGC)
- ONGC Energy Centre
- NTPC Energy Technology Research Alliance (NETRA, NTPC)
- Cairn Oil and Gas, Vedanta Limited
- Gail (India) Limited
- Tata Steel Limited, Jamshedpur
- Science and Engineering Research Board (SERB)
- Ministry of Science and Technology, Department of Scientific and Industrial Research
- ONGC–TERI Biotech Limited