2025

SPRERI
Striving for Excellence

SPRERI NEWSLETTER

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About Us

Sardar Patel Renewable Energy Research Institute (SPRERI), an autonomous organization based in Anand, Gujarat, has been at the forefront of renewable energy research, development, and commercialization since its establishment in 1979. Recognized nationally and internationally, SPRERI is known for its pioneering contributions to renewable energy technologies through fundamental research, pilot-scale demonstrations, and the commercialization of innovative solutions

Thrust Areas

The key focus areas of SPRERI include Renewable Energy, New and Alternative Energy Technologies, Energy Security, and Environmental Sustainability. SPRERI operates through four specialized divisions.

Divisions

Solar Energy

Bio-chemical Conversion

Thermo-chemical Conversion

Technology Transfer & Extension

The four divisions—Solar Energy, Bio-chemical Conversion, Thermo-chemical Conversion, and Technology Transfer—are deeply involved in research, development, demonstration, and commercialization of advanced technologies across various fields of renewable energy, environmental sustainability, and climate change. Their work encompasses hydrogen technologies, carbon mitigation, solar thermal, solar photovoltaic, water remediation, biofuels, biomass-to-electricity, and the production of valuable byproducts through energy conversion and waste bioconversion. SPRERI is also actively engaged in the development of government policies and programs, providing training, capacity building, and extension support. Additionally, it offers consultancy services, business development assistance, conducts testing, evaluation, and certification of renewable energy technologies

Legendary founders, Late Dr. H. M. Patel and Late Mr. Nanubhai Amin

The institute is recognized as scientific and industrial research organization by Department of Scientific and Industrial Research (DSIR), Bureau of Indian Standards (BIS), National Accreditation Board for Testing and Calibration Laboratories (NABL) and empaneled with Tata Institute of Social Sciences (TISS).

Vision

SPRERI aims to develop environmentally friendly renewable energy technologies that are efficient and economically sustainable for society

Mission

To excel in research, development, and the commercial deployment of renewable energy technologies, while promoting environmentally sustainable solutions through education, training, and public-private partnerships for India and other developing global economies

Board of Management

Er. Bhikhubhai B. Patel Chairman	**Chairman**
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Dr. Anil Kumar Dubey Director, SPRERI, Anand, Gujarat	Member Secretory

Research and Development

Synthesis of Bio-lubricants from Microalgal Lipids

The lubricant industry, covering automotive, mechanical, aviation, hydraulic, marine, and power sectors, largely depends on synthetic and mineral oils derived from crude petroleum. Owing to their fossil origin and environmental impact, renewable alternatives such as microalgae-based oils are gaining attention for biolubricant production. Microalgal oils typically contain 92–98% triacylglycerides (TAGs) with various fatty acids linked to a glycerol backbone. Their key properties viscosity, lubricity, pour point, and oxidation stability depend on the TAG structure and fatty acid composition. In this study, a novel microalgae strain, Nephrocytium sp., was isolated and cultivated, yielding up to 2.3 g/L of dry biomass with a lipid content of 30–40%. Biolubricant synthesis was optimized through esterification and transesterification reactions using castor oil as a reference. Castor oil was transesterified with methanol and a base catalyst to form methyl esters, which were further reacted with higher alcohols trimethylolpropane, neopentyl glycol, or pentaerythritol using lipase enzymes. The resulting bio-lubricant from castor oil corresponded to ISO VG 11 grade, suitable for light-duty industrial applications. In comparison, the biolubricant derived from Nephrocytium sp. lipids achieved ISO VG 32 grade, suitable for hydraulic systems and compressors, highlighting the potential of microalgal oils as sustainable feedstocks for next-generation lubricants.

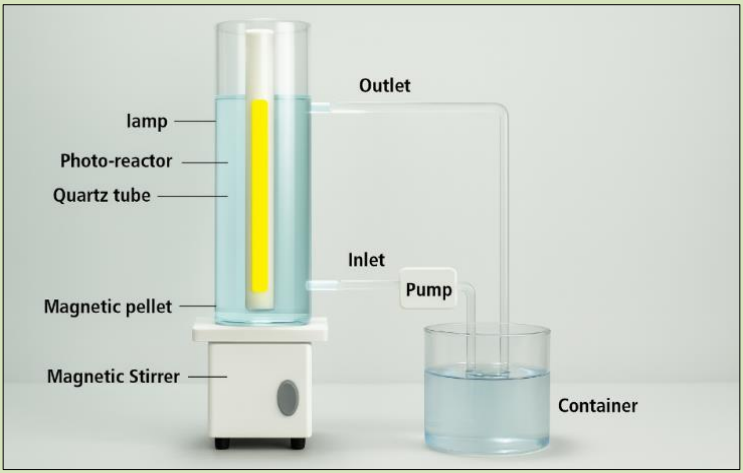
Properties of Bio-lubricants from Castor Oil and Microalgal Lipid

Oil	Density (g/cm^3)	Kinematic viscosity at 40° C (mm^2/s)
Castor Oil (after transesterification)	0.91	10.20
Castor oil + Neopentyl Glycol (NPG)	0.93	19.10
Castor Oil + Trimethylolpropane (TMP)	0.89	11.10
Castor Oil + Pentaerythritol (PE)	0.91	17.80
Microalgal lipid + NPG	1.03	34.00

Research and Development

Biochar-enhanced Photocatalysis for Hydrogen Production

The Solar Energy Division at SPRERI has initiated an innovative research programme to develop biochar-integrated photocatalysts for sustainable hydrogen production from agro-industrial wastewater. This work aims to simultaneously address two critical challenges *viz.* environmental remediation and renewable energy generation through a single, integrated process. Photocatalysis offers a green pathway to convert sunlight and wastewater into valuable hydrogen fuel while degrading organic pollutants. By combining semiconductor materials with biochar derived from agricultural residues, SPRERI's approach seeks to enhance photocatalytic efficiency by harnessing broad solar spectrum. A lab-scale photocatalytic reactor is currently under development to demonstrate this concept. Once operational, the developed system will provide a scalable model for clean hydrogen generation from waste resources supporting circular economy principles and national missions on Green Hydrogen and Waste-to-Wealth.



Schematic of Photocatalytic Reactor

Events

MoU between SPRERI and Gram Panchayat, Bhadrasa, Kheda, Gujarat

SPRERI signed an MoU with the Gram Panchayat, Bhadrasa on July 24, 2025, for the establishment of a community-scale biogas plant which is an intervention under the DST-SUNIL project. The biogas plant will convert locally available organic waste into clean energy for cooking and lighting, thereby reducing dependence on conventional fuels and contributing to sustainable village-level energy management.

MoU Signing between SPRERI and Gram Panchayat, Bhadrasa

MoU between SPRERI and Roshani Sakhi Mandal, Agas, Petlad, Gujarat

SPRERI signed an MoU with Roshani Sakhi Mandal, Agas, Petlad, Anand on August 19, 2025, to promote value addition of agricultural residues. The collaboration focuses on utilizing banana pseudostem as a raw material for producing paper and handicraft products. This initiative aims to create sustainable livelihood opportunities for rural women through skill development and entrepreneurship.

MoU Signing between SPRERI and Roshani Sakhi Mandal, Petlad

Events

Training Program on Extraction and Combing of Banana Fiber

SPRERI organized a one-day training program on “Extraction and Combing of Banana Fiber” on August 19, 2025. Members of Roshani Sakhi Mandal from Petlad Taluka, Anand district, participated in the training. An expert engineer demonstrated the operation of banana fiber extraction and combing machines, providing hands-on training to all participants. The traditional method of banana fiber extraction and combing is labor-intensive and time-consuming. To enhance efficiency and simplify the process, SPRERI procured modern banana fiber extraction and combing machines for training and demonstration purposes.

Glimpse of Training Program

Awareness of Renewable Energy Technologies

An awareness program on Renewable Energy Technologies was successfully conducted at Gojosharda Mandir School on September 25, 2025. The initiative aimed to educate students about sustainable energy solutions and their vital role in creating a cleaner future. The session showcased various renewable energy sources, including solar, wind, biogas, and biomass, highlighting how these technologies can help reduce reliance on conventional fossil fuels.

Glimpse of Awareness Program

Invited Lectures/Panelist/Visits

- Dr. Geeta Kumari and Er. Bhavin Soni visited Vidya Dairy, Anand on July 17, 2025 for the discussion on improving BMC effluent treatment set-up.

- Er. Bhavin Soni visited Banas Dairy, Banaskantha on August 11, 2025 for the discussion on Spoke to Hub model for biochar production.

- Dr. Mukul Dubey, delivered an invited lecture at Vidya Dairy, Anand, on August 21, 2025, as part of the program “New Developments in Energy Management of Food and Dairy Operations.” His talk focused on the use of solar energy technologies in dairy and food processing industries, highlighting innovative approaches for improving energy efficiency and sustainability in the sector.

- Dr. Geeta Kumari and Er. Bhavin Soni visited Climate Change Department, Government of Gujarat on September 11, 2025 for the discussion on spoke to Hub project.

- Dr. Anil Kumar Dubey delivered a podcast on September 15, 2025 for BVM College on the topic “Technological Advancements in Renewable Energy”.

- Dr. Anil Kumar Dubey delivered an invited lecture at the Solar Contractors Meet held in Surat on September 16, 2025. His talk, titled “Smart Cities Need Smart Solar – Role of Technology in Urban Solar Integration,” highlighted the importance of advanced solar technologies and intelligent energy systems in shaping sustainable urban infrastructure.

- Dr. Mukul Dubey was invited to the Solar Contractors Meet held in Surat on September 16, 2025, to discuss emerging trends, implementation challenges, and best practices in solar project deployment and maintenance.

- Dr. Geeta Kumari invited to Gujarat Climate Change Awards 2025–26, organized by Gujarat Climate Change Department (GCCD) and Gujarat Energy Development Agency (GEDA) in Gandhinagar on September 16, 2025

Publication, Conference Presentation and Training

Publication

- B Chandekar, M V Rohit, SKS Patel. Green bioprocess development using sawdust hydrolysate for efficient hydrogen production by novel Staphylococcus epidermidis SPS3. Fuel 404, 136335 (2026)

- MJ Borah, A Das, M V Rohit, N Singh, K Mohanty. Catalytic hydrothermal liquefaction of Chlorella sorokiniana for high quality biocrude production over Mg modified activated red mud catalyst. Journal of Analytical and Applied Pyrolysis, 107384 (2026)

Conference/webinar presentation

- Dr. Rohit Kumar Singh attended webinar on "Green Hydrogen Certification Scheme of India" Sponsored and organized by Federation of Indian Petroleum Industry (FIPI) in association with KPMG on July 17, 2025

- Dr. Rohit Kumar Singh attended webinar on "Biofuels" Sponsored and organized by Federation of Indian Petroleum Industry (FIPI) in association with S&P Global on August 21, 2025.

- Dr. Rohit Kumar Singh attended webinar on " Environmental & Earth Sciences Session 1" Sponsored and organized by MDPI Reviewer Club 2025 on September 4, 2025

For more details and registration, please visit www.spreri.org

Let's work together to achieve net zero mission of country's future!

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