

Centre for Hydrogen and Green Technology [CH₂GT]

Centre for Hydrogen and Green Technology

United Nations has called for immediate action by all the countries. It emphasizes creating an avenue for affordable, reliable, sustainable, and modern energy, to combat climate changes and their impact along with the revitalization of the global partnership for sustainable development. Concurrently, the Government of India has initiated the National Hydrogen Energy Mission (NHEM) with a prime focus on the generation of hydrogen from green power resources and to link India's growing renewable capacity with the hydrogen economy. In line with the initiatives of the United Nations and the Government of India, RV College of Engineering has started the **Centre for Hydrogen and Green Technology (CH₂GT)**.

India gave a head start to the hydrogen and fuel cells in 2006 itself, however, it did not gain a lot of momentum until the NHEM was started. At present, the hydrogen requirement in India is around 6 Million Tons (MT) and it is expected to grow to 28 MT by 2050. It is a market worth \$160 billion which is currently being imported. Recently, Reliance Industries Limited (RIL) disclosed that it is aiming to be a net-zero company by 2035 and will be investing Rs. 75,000 Crores (~8.6 billion euros) in a clean energy project involving the manufacturing of electrolyzers and fuel cells. RIL formed India Hydrogen Allowance (IH2A) along with Jindal South West (JSW) Group another steel, mining, and energy giant. According to IH2A, Hydrogen finds its applications in the steel and cement industry in the short and medium-term following by its applications in the Chemical, fertilizers, and transport industries in the long term.

Vision

Empowering youth through the development of affordable, reliable, and sustainable Hydrogen energy systems and solutions

Mission

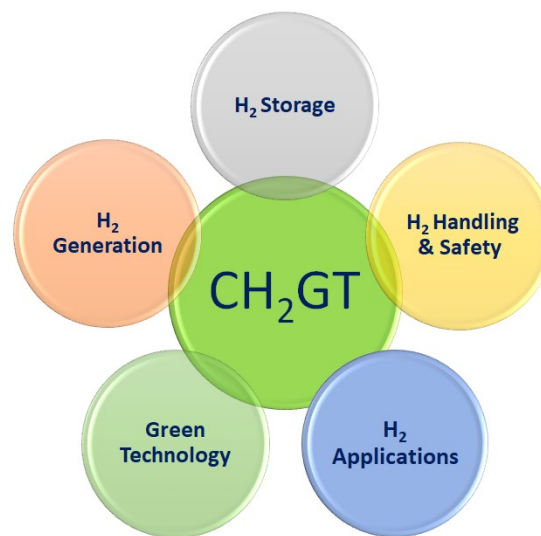
1. Developing affordable, reliable and sustainable Hydrogen energy systems
2. Providing sustainable solutions to industrial and societal problems

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3. Enhancing employability and creating start up culture in aspiring minds
4. Promoting innovation and entrepreneurship among youth

Under the new CoE - Centre for Hydrogen and Green Technology Research, five modules are formulated. Under each module, a few projects are completed and a few are planned. The following are the modules

1. Hydrogen Generation
2. Hydrogen Storage
3. Hydrogen handling and safety
4. Applications of hydrogen
5. Green Technology



Under module 1 many projects on generating hydrogen by water splitting and from wastewater are carried out. A novel inexpensive catalyst is developed for water splitting. Low cost highly efficient non-stoichiometric hybrid cobalt/selenium/lithium/titanium-based nanocomposites are developed for water splitting. These catalysts show low overpotentials at high current densities and a high electrochemically active surface area.

Under module 2 development of lab-scale hydrogen storage systems based on metal hydrides and liquid organic hydrogen carriers are planned.

Under module 3, two metal oxide-based hydrogen sensors are developed. One sensor can

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only detect hydrogen gas whereas the other can detect as well as quantify the hydrogen gas up to 2% by volume. An Indian patent is published on the former and an Indian patent is granted for the latter. These two sensors work under ambient temperature and pressure and don't use noble metals. The sensors are selective to hydrogen gas only and have very little / no cross sensing.

Under module 4, few projects are initiated. The goal is to address the 'well to tank' part of the fuel generation, to reduce the carbon footprints and the dependence on fossil fuels through the development of a self-sustained fuel cell vehicle.

Under module 5, projects such as applications of graphene and its derivatives in carbon capture and conversion are planned.

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Overview of activities carried out under CH2GT from March 2021 to February 2022

Sl. No.	Activities	Count	Faculty Involved	Students Involved	(Expected) Outcome
1	Internship	1	8	66	25 Conference presentations and 22 publications as conference proceedings in Scopus indexed journal (ECS Transactions)
2	Student Projects	10	3	17	Conference proceedings / Publications / Patents
3	Conference Proceedings	22	8	25	-
4	Publications	2	2	4	-
5	Patents	2	2	1	-
6	Tech Talks	5	1	5	Collaboration / Student Projects
7	External Collaborations	4	2	-	Tech Talks / Student Projects / Student Internships
8	Funded Project	1	2	-	Publications, Conference Proceedings, Patents
9	Courses	1	1	61	Conference Proceedings / Student Projects / Publications / Patents / Collaborations / Tech Talks
10	Proposals	3	3	-	-
11	MoUs	3	1	-	Consultancy / Student Internships / Student Projects / Funding
12	Student Chapter	1	2	6	Student Activities Funding for student projects