



# A QUANTUM OF MATTER

## Green Hydrogen: A future energy Vector.

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**Aula B107 – Polo Ferrari (Povo 2), Povo**

The world is working at a remarkable pace to cope with the energy demand and replace conventional fossil-fuel-based energy with affordable, reliable, and cost-effective green energy sources, like hydrogen. Green Hydrogen produced by electrolysis of water through renewable energy sources is one of the go-to techniques for the same. However, the choice of catalyst, electrolyte, and operating conditions play a significant role in energy generation and pilot/industrial scale production. In this seminar, I will focus on the challenges faced by the electrocatalyst when operated in the dynamic conditions of intermittent renewable energy sources. Several material engineering strategies implemented to improve the performance and stability of the electrocatalyst will be presented.

### **Who is Nainesh Patel?**

Dr. Nainesh Patel is working as an Associate Professor of Physics, at Christ University. He had completed his Ph.D. degree from the University of Trento, Italy, under the supervision of Prof. Antonio Miotello. His research interest is focused on developing low-cost nano-catalyst for energy and environmental applications, in which he has an experience of over 19 years. He is currently working on developing a prototype of an anion-exchange membrane water electrolyzer using a cost-effective and robust transition metal electrocatalyst for hydrogen production through splitting alkaline water, seawater, and urea-based wastewater. He is also intensively involved in developing photocatalyst materials for the removal of organic pollutants from water and H<sub>2</sub> production by photocatalytic water splitting. He is a co-author of 112 research papers in peer-reviewed journals of international repute and has an h-index of 43 and citations of around 6650. For three years, his name appeared in the list of the top 2% of scientists in the world, published by Stanford University. He has successfully executed 4 Government funded research projects nationally and internationally and currently handling 3 projects on developing catalysts for energy and environmental issues. He has guided 12 Ph.D. students.

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**A Quantum of Matter** is a series of events dedicated to the research in Physics of Matter that is carried out in the **Physics Department of the University of Trento**. The goal of **A Quantum of Matter** is to develop synergies and collaborations between research groups: for this reason, the seminars will focus not only on the results obtained, but also on the techniques employed by the groups and on the possible research themes that could be developed in partnership, leaving plenty of room for exchange of opinions and discussion.

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