

# Machine Learning for Sustainable Energy Materials and Technologies

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As a major enabler for most of human activities from food and fresh water production to transportation, telecommunication and healthcare, the energy is a critical ingredient for a sustainable future. While UN Sustainable Development Goal 7 (SDG 7) directly aims to “ensure access to affordable, reliable, sustainable and modern energy for all”, most of 169 targets stated under the all of 17 SDGs are also involved with energy production or utilization. Machine learning (ML), as another enabler technology of recent years, has been employed in most of the activities in SDGs as well as the implementation projects and programs to attain SDGs through data collection,

monitoring and analysis. ML also frequently used in sustainable energy production and storage technologies including the search and design of new materials. In this presentation, the potential roles of ML for the sustainable energy future, will be discussed. First, the basic principles and more recent developments will be summarized Then the use of ML in energy production and storage will be discussed in detailed examples together with a perspective on the challenges and opportunities for the future.



Ramazan Yıldırım is a professor of Chemical Engineering at Boğaziçi University. He received his B.Sc from Ege University and his MS is from Boğaziçi University. Then, he moved to University of California, Los Angeles where he received his Ph.D. After his Ph.D., he had worked as quality and management consultant for about five years before he joined Boğaziçi University Chemical Engineering Department in 2001 as a full time professor. His research focuses on catalysis and photocatalysis, machine learning analysis of energy conversion technologies (e.g. catalytic hydrogen production and purification, water splitting, photocatalytic CO<sub>2</sub> reduction, biofuel production and solar cells) and energy storage systems.