**Heterogeneous Photocatalysis as a Powerful and highly versatile Tool for Solar Energy Utilization : Toward Clean and Renewable Energy Production-Conversion as well as Environmental Protection-Remediation**

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**Abstract**

At the global level, it is well acknowledged that today's world is at a turning point. More than ever before, it is universally admitted that our modern society faces enormous catastrophic challenges that urgently and immediately need to be addressed e.g. global warming, climate change, environmental destruction, energy shortage, global water crisis, food insecurity, global peace and security and political stability. Even though many national and international agreements have been established by most governments and countries around the world, many of these challenges look like never-ending problems and many of them may become worse and more frightening in the near future. In this alarming situation and in order to achieve the sustainable development of human society and keep a sustainable world for our children and our future generations, serious attention as well as urgent if not immediate solutions are required to quickly solve those challenging problems before they persist and become irreversible. This will require substantial changes in all aspects of our society: on how we use natural resources, how we use land, water and energy, how we protect the environment, how we grow food, transport goods, how we perform all our economic, social, technological and political decisions and actions and so on. Toward this goal, multi-pronged, fully committed and cooperative efforts are needed from central and local governments, national and international agencies, voluntary organizations, private and public sectors, scientists, researchers, individuals and the whole community in general. In this context, researchers and policymakers from all over the world have been working on various approaches by doing their best to address environmental and energy related problems through solar energy utilization. Indeed, the sun is considered as a free, renewable, inexhaustible, readily available and eco-friendly energy source accessible on Earth. Among the numerous appealing and attractive technologies available today, heterogeneous photocatalysis has been recognized as one of the most promising strategies for solar energy utilization. This technology has recently attracted much attention for settling the energy crisis and global environmental issues we are currently facing, owing to its applicability in air and water purification, electricity generation, phototherapy, solar fuels generation, CO2 reduction, bacteria inactivation, green hydrogen production and N2 fixation. In this contribution, I will give a shor overview about the effectiveness of heterogeneous photocatalysis in the field of solar energy utilization for applications in the areas of clean and renewable energy production-conversion-storage as well as environmental protection and remediation.