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Recent Developments in Environmental Engineering and Pollution Control

Jeryang Choi*

Department of Civil and Environmental Engineering, Seoul National University, Seoul, Republic of Korea

***Corresponding Author:** Jeryang Choi, Department of Civil and Environmental Engineering, Seoul National University, Seoul, Republic of Korea, E-mail: choi81@jery.ac.kr

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DESCRIPTION

Environmental engineering and pollution control are important fields in addressing the challenges posed by the impact of human activities on the environment. Recent developments in these fields have focused on finding innovative solutions to reduce environmental pollution, minimize waste, and conserve natural resources. The use of renewable energy sources, such as solar, wind, and hydroelectric power, has gained increasing attention in recent years. These energy sources offer a sustainable alternative to traditional fossil fuels, which emit harmful pollutants that contribute to air and water pollution. Renewable energy sources are clean, produce no harmful emissions, and are a significant step towards achieving a carbon-neutral future.

Bioremediation is a technique that uses living organisms to remove pollutants from the environment. This technique has been applied in cleaning up contaminated soil, water, and air. In recent years, the application of bioremediation has expanded to include the use of genetically engineered microorganisms that are capable of breaking down complex pollutants that are resistant to traditional remediation techniques.

The zero waste approach aims to minimize waste generation and to reuse or recycle all waste products. The goal is to eliminate waste that ends up in landfills or oceans. This approach focuses on reducing waste at the source, optimizing product design, and encouraging a circular economy. A circular economy involves the reusing of materials, energy, and water in a closed loop system, resulting in a more sustainable and efficient use of resources.

Carbon Capture and Storage (CCS) is a process that captures Carbon Dioxide (CO₂) emissions from industrial processes and stores them underground or repurposes them for industrial use. This technology can help reduce greenhouse gas emissions and mitigate climate change. In recent years, the application of CCS has expanded to include the capture and storage of CO₂ from power plants, steel mills, and other industries.

Air pollution is a significant environmental concern worldwide, affecting human health and the environment. Recent developments in air pollution control include the development of advanced filters and scrubbers, which are capable of removing pollutants from industrial emissions. In addition, advances in air quality monitoring systems and data analysis have enabled more precise monitoring and control of air pollution.

Water pollution is a major issue that affects ecosystems, human health, and the economy. Recent developments in water pollution control have focused on the development of advanced treatment technologies that remove pollutants from wastewater. These technologies include membrane filtration, biological treatment, and advanced oxidation processes. In addition, the use of natural systems, such as wetlands, has gained attention as a sustainable approach to

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treating wastewater.

Smart environmental monitoring systems use sensors, data analytics, and machine learning to monitor environmental conditions and provide real-time feedback. These systems enable more accurate and timely detection of environmental pollution, allowing for faster responses and more effective pollution control measures. Smart monitoring systems also enable better understanding of environmental conditions and facilitate more effective management of natural resources.

Recent developments in environmental engineering and pollution control have focused on finding innovative solutions to reduce environmental pollution, minimize waste, and conserve natural resources. Advances in renewable energy, bioremediation, zero waste, carbon capture and storage, air pollution control, water pollution control, and smart environmental monitoring have enabled us to tackle these challenges and move towards a more sustainable and environmentally friendly future. These developments highlight the importance of investing in research and development to address the environmental challenges facing our planet.