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Sommario/riassunto

The establishment of clean, safe water is one of the major challenges facing societies around the globe. The continued urbanization of human populations, the increasing manipulation of natural resources, and the resulting pollution are driving remarkable burden on water resources. Increasing demands for food, energy, and natural resources are expected to continue to accelerate in the near future in response to the demands of these changing human populations. In addition, the complexity of human activities is leading to a diversity of new chemical contaminants in the environment that represent a major concern for water managers. This will create increased pressure on both water quantity and quality, making it increasingly difcult to provide a sustainable supply of water for human welfare and activities. Although protection of water resources is the best long-term solution, we will also need innovative novel approaches and technologies to water treatment to ensure an adequate superiorquality resource to meet these needs. Solving tomorrow’s water issues will require unique approaches that incorporate emerging new technologies. Great advances have been made in the area of nanotechnology. Due to their unique physical and chemical properties, nanomaterials are extensively used in antibacterial medical products, membrane filters, electronics, catalysts, and biosensors. Nanoparticles can have distinctly different properties from their bulk counterparts, creating the opportunity for new materials with a diversity of applications. Recent developments related to water treatment include the potential use of carbon nanotubes, nanocompositae, nanospheres, nanobers, and nanowires for the removal of a diversity of chemical pollutants. By exploiting the assets and structure of these new materials, such as increased surface area, high reactivity, and photocatalytic action, it will be possible to create technologies that can be very efcient at removing and degrading environmental pollutants. Understanding and using these unique properties should lead to innovative, cost-effective applications for addressing the complexities of emerging needs for water treatment and protection. Although still in the early stages, research into the application of nanotechnology shows great promise for solving some of these major global water issues. This comprehensive text describes the latest research and application methods in this rapidly advancing field.