

# Recent advances in preparation, characterization and applications of Titanium Oxide nanotube arrays

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Titanium Dioxide Nanotube Arrays (TNAs) represent a significant breakthrough in field of nanotechnology. TNAs possess remarkable chemical and physical characteristics and have proven to be flexible materials with broad-ranging applications in environmental and energy technologies [1-3]. The applications of TNAs have extend to various fields, such as photocatalysis, sensor technology, hydrogen production, and dye-sensitized solar cells relying on their outstanding specialties, which include a high specific surface area, admirable charge transfer abilities, and superior chemical stability. The electrochemical anodization of titanium sheet is a method to fabricate highly ordered TNAs, emphasizing the pivotal advantage of achieving high surface areas within a tubular structure. Compared to other TiO<sub>2</sub> nanostructures, TNAs demonstrate noteworthy performance electrochemically, owing to the augmented surface area and reduced diffusion length. This work presents an all-embracing summary of TNAs; outlining their methods of synthesis and application areas. Latest advances and developments in this field are also comprised.

## References

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