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Light Reflection and Absorption by Free Standing Titania Nanotube Arrays[1] ABDELMOULA MOHAMED, JEFFREY SOKOLOFF, MENON LATIKA, Northeastern University, Boston, MA 02115 — Newly discovered titania nanotube arrays fabricated by anodization have become the main interest of many research groups around the world, mainly due to their potential use for solar energy harvesting. Light conversion to electron-hole pairs can occur in the surface area of these nanotubes, resulting from their very high aspect ratio and the low recombination probability in the titian surface. In our work we have investigated the transmission of light though the nanotubes for different tube lengths, to explore the penetration depth for various wavelengths in the nanotube array. Specifically, we have investigated the reflection and transmission of light incident from both the open and closed sides of the nanotubes. We find that the reflectivity is generally noticeably smaller for light incident on the open end, but the transmission is about the same, implying greater absorption for light incident on the open side, although for wavelengths close to 400nm, the reflectivity from the open side becomes larger than that from the closed side. We will present a theoretical model to explain our experimental results. The model treats wave propagation along the tubes in the eikonel approximation, and wave propagation transverse to the tubes as Bloch waves.

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