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**Critical parameters and factors in the formation of spaced TiO<sub>2</sub> nanotubes by self-organizing anodization**

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**Abstract**

Self-organized TiO<sub>2</sub> nanotube arrays can be grown under a wide range of electrochemical conditions. In the present work, we evaluate the occurrence of spacing between tubes and the connection of this effect to organization of tubes on two-size scales. The results show that tube-spacing is initiated in the very early stages of anodization between individual pore morphologies. Furthermore, the spacing, as well as the organization on two-size scales can be controlled by changing the anodization conditions, e.g., electrolyte composition, applied voltage and temperature. Namely, adjustment of H<sub>2</sub>O content, electrode temperature and voltage can lead to spaced nanotubes, and allow to control spacing. Finally, we draw conclusions on possible mechanism relevant to the growth of spaced tubes.

**Keyword:** Anodization, TiO<sub>2</sub> nanotubes, Two-size scale, Spaced nanotubes

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