**Gold Titanate Nanoparticles – Synthesis, Properties & Applications**

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**Objective:** The aim of this study was to customize the properties of nanoscale gold titanates through a sol-gel process and characterize the resulting nanoparticles and investigate their potential antimicrobial applications.

**Methods:** Two synthetic strategies, sol-gel and hydrothermal, were employed to produce nanoscale gold titanates. Methodologies have been previously discussed. Briefly, the hydrothermal synthesis entailed adding 1.875 g of TiO₂ powder to 150 mL of 10 M NaOH and the resulting mixture was vigorously stirred for 1 hour. The reaction mixture was then heated in a pressure reactor at 110 °C for 24 hours. The formation of sodium titanate nanotubes of the form Na Ti O (OH) ensues by self-assembly of the dissolved intermediate of TiO₂ and NaOH. The resulting suspension was then cooled to room temperature and filtered. The solids were washed with ultrapure water (MilliQ Element) to a pH of approximately 9 before drying in air. Nanoscale particles of monosodium titanate (MST) were prepared by a proprietary process adapted from the previously published sol-gel process for the preparation of micron-sized MST. Particle morphology and size for both synthetic strategies were verified with SEM, TEM and EDX.

**Conclusions:** The nanoparticles can be produced by the methods that we proposed. One of the shortcomings of the metal titanate materials can be turned around to be its advantage. Metal titanates are known to discolor due to the ease of redox reactions (Figure 3). Their applications in direct restorative materials is thus limited. However, the compatibility of metal titanate with titanium implants actually make them a useful coating as a weapon to fight peri-implantitis.

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