Nano-Manufacturing by Ultrafine Particles

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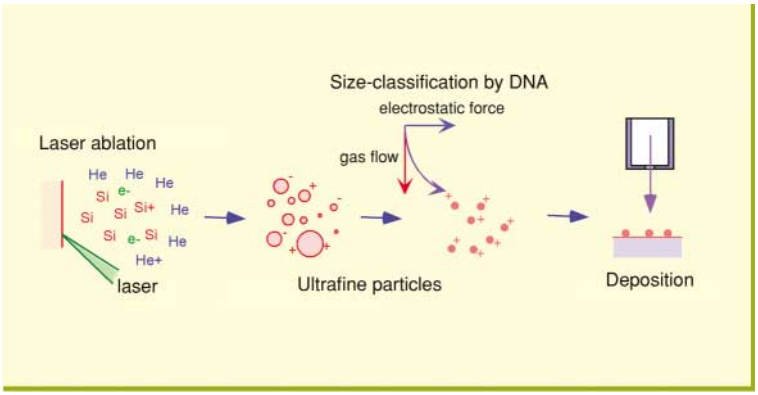
We developed the system for the synthesis of ultrafine particles of very pure silicon single crystals with the required size less than 50 nm. Uniform silicon ultrafine particles were synthesized by laser ablation with a differential mobility analyzer (DMA) technique. From a transmission electron microscope (TEM) observation of deposited particles, it was found that they were well-isolated and uniform in size. High resolution TEM images indicated that they were single crystals. This system has a potential to supply building blocks for a new kind of quantum devices.



Synthesis, size-classification and deposition process of ultrafine particles

Bleaching with TiO_2 Photocatalyst

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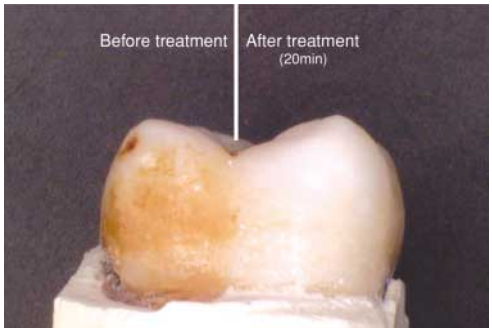
A titanium dioxide photocatalyst produces vital oxygen, OH radicals, and other species by exposure to light. This action allows ready decomposition of various organic chemical substances normally difficult to decompose. Titanium dioxide is thus believed to function effectively in the decomposition of dental colorants with a potential application as a dental bleaching agent. To establish a method for safe, simple, and expeditious tooth bleaching using titanium dioxide, we studied the potential use of titanium dioxide as a dental bleaching agent by applying a dilute, blended solution of hydrogen peroxide and titanium dioxide to the surface of extracted, discolored teeth; providing light irradiation; and observing changes in the coloration and other aspects of the teeth. All teeth demonstrated an effect from roughly 10-30 minutes of bleaching. To investigate the bleaching-induced change in the properties of the enamel, the microstructure of the tooth enamel was also observed before and after bleaching. The results showed virtually no change.



Bleaching with H_2O_2:3.5% and TiO_2