Development of a system capable of machining a metal tube of a human hair size into a complex shape

Highly functional microscopic medical instruments will be realized

Existing machining technologies have several problems: machining is sometimes impossible because the minute tube to be machined and the working tool come into contact with each other at a point other than the machining position; a tube of too small a diameter cannot be machined because it is easily bent by the tool contact force during machining; and finally, a general problem in any minute tube machining technology is that the tube cannot be precisely held.

The newly developed system adopts a non-contact laser machining technology in which the tube is not subjected to force during machining. As the same laser light source is used for both machining and measurement, no displacement appears between the measured and the machined positions, and the laser beam is irradiated on the precise position by means of an error-compensation even if the target tube has holding-position error. Through electrochemical finish machining, the heat-affected layer inherent to laser machining is removed to provide a smooth surface.

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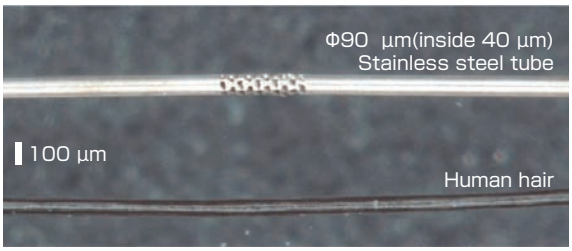

- Mesh holes
- Holes width 20 μm
- Holes penetrating to inside
- Total machining time 3 min.

Laser and electrochemical complex machining result

Development of low-cost photocatalyst responsive to visible light

Applicable to fiber, textile and plastic

We have developed a low-cost photocatalyst responsive to visible light and applicable to fiber, textile and plastics. The novel photocatalyst is composed of titanium dioxide, apatite and iron. It showed excellent activities of acetoaldehyde decomposition, NOx removal and anti-bacterial effect under visible light as well as UV light. The acetoaldehyde decomposition activity of the novel photocatalyst is 5.9 times higher than that of the conventional titanium dioxide photocatalyst under fluorescent lamp. Although photocatalysts responsive to visible light are usually yellow, the novel photocatalyst is almost white and it does not change color when it is coated on a white object. The novel photocatalyst helps to expand the market of photocatalytic products, because it makes possible its use for various indoor applications which were difficult to be realized by conventional photocatalysts.

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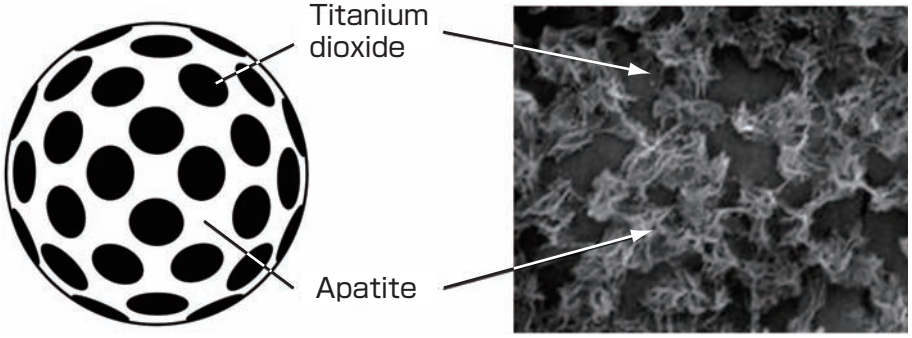

Diagram of the novel photocatalyst (left) and the SEM photograph of it (right)