

# Research and Development of Ultrasound Toothbrush with Mechanical Vibration

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## Abstract

The purpose of this study is to develop a prototype of ultrasonic toothbrush, which is able to reduce the bacterial plaque on the tooth surface, and maintain the oral hygiene from the diseases. This powered toothbrush is designed to clean the tooth surface by the mechanism of ultrasound and mechanical vibration. The ultrasound intensity distribution on the tooth surface is calculated by the computer simulation to determine the adequate parameters such as the driving frequency, dimensions of the transducer, and brush length. The L-type matching circuit is used in the circuit of this system to reduce the reflection and improve the efficiency. We have designed a system to measure the output acoustic power of the transducer and found that the output power of the transducer is 0.2W. Finally, the efficiency of cleaning bacterial plaque is evaluated by the plaque index. The results show that the tooth with about 20% plaque index could be reduced to about 2% plaque index by this instrument. This ultrasound toothbrush with mechanical vibration can effectively reduce the dental plaque index from tooth surfaces.

**Keywords:** Ultrasound, Toothbrush, Transducer, Dental plaque

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