Abstracts

Application of microwaves and millimeter waves for the characterization of teeth for dental diagnosis and treatment

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This paper presents applications of microwaves and millimeter waves for the characterization of teeth. This is done by measuring the complex permittivity over the frequency range from 0.04 to 40 GHz. These measurements have revealed that dental caries are significantly more lossy to microwaves and millimeter waves than the healthy tooth, and this difference can be used for dental diagnosis. The experimental results have been confirmed by using the finite-difference time-domain (FDTD) method. In addition, millimeter-wave heating of the lossy dental caries can be used as a sterilization treatment. It is concluded that millimeter waves can be used for dental medical diagnosis as well as dental medical treatment.

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