

**METHOD AND APPARATUS USING INFRARED PHOTOTHERMAL
RADIOMETRY (PTR) AND MODULATED LASER LUMINESCENCE (LUM)
FOR DIAGNOSTICS OF DEFECTS IN TEETH**

ABSTRACT

There is provided a high-spatial-resolution dynamic diagnostic instrument which can provide simultaneous measurements of laser-induced frequency-domain infrared photothermal radiometric and alternating-current (ac) modulated luminescence signals from defects, demineralization, remineralization and caries in teeth intraorally. The emphasis is on the abilities of this instrument to approach important problems such as the detection, diagnosis and ongoing monitoring of carious lesions and or defects on the occlusal pits and fissures, smooth surfaces and interproximal areas between teeth which normally go undetected by x-ray radiographs or visual examination. The instrument is also able to detect early areas of demineralized tooth and or areas of remineralized tooth as well as defects along the margins of restorations. This capability of inspecting a local spot can be extended to a modulated imaging of sub-surface of target tooth by using a multi-array infrared camera. Two configurations of the instrument are presented.

Fig. 6