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# Intraoral Dental Imaging Device Based on the CMOS Photosensor Array Coupled with an Integrated X-ray Conversion Fiber Optic Faceplate

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As a continuation of our digital X-ray imaging sensor R&D, we have developed a cost-effective, intra-oral dental imaging device based on the CMOS photosensor array coupled with an integrated X-ray conversion fiber optic. It consists of a commercially available CMOS photosensor of 35x35 um2 pixel size and 688x910 pixel array size, and a high efficiency X-ray film scintillator (~90 um thick columnar CsI:Tl) directly deposited on a fiber optic faceplate of 6um core size with an 85/15 core-clad ratio (NA~1.0 in air) and an 1.46 mm thickness. The fiber optic faceplate is a highly X-ray attenuating device that minimizes X-ray absorption on the end CMOS sensor (~0.3% at 70 kVp), thus minimizing X-ray induced noise at the sensor. It uses a high light output columnar CsI:Tl scintillator with a peak spectral emission at 545 nm, giving high spatial resolution (~17% CTF at 10 lp/mm), but attenuates some of this light due to interfacial and optical attenuation factors (transmission at 545 nm ~ 65%). In this study, we presented its performance analysis with experimental measurements and acquired X-ray images.

Keywords : Intra-oral Dental Imaging Device, Fiber Optic Faceplace, Columnar CsI:Tl