CLAIMS

1. A system for visually examining dental tissue, comprising:

a first light source having a first peak wavelength;

a second light source having a second peak wavelength that is at least 10 nm longer than the first peak wavelength;

a processor;

an imaging unit; and

a memory in communication with the processor, the memory storing programming instructions executable by the processor to:

capture a first image of dental tissue under the first light using the imaging unit;

capture a second image of the dental tissue under the second light using the imaging unit;

determine a first red value and a first green value associated with a point on the dental tissue as shown in the first image;

determine a second red value and a second green value associated with the point on the dental tissue as shown in the second image;

create a third image of the dental tissue, where a portion of the third image depicting the point on the dental tissue is adapted using a modification function that is a function of both

(i) a ratio of the second red value to the first red value; and

(ii) a ratio of the first green value to the second green value.

2. A system for visually examining dental tissue, comprising:

a first light source having a first peak wavelength;

a second light source having a second peak wavelength that is at least 10 nm longer than the first peak wavelength;

a processor;

an imaging unit; and

a memory in communication with the processor, the memory storing programming instructions executable by the processor to:

capture a first image of dental tissue under the first light using the imaging unit;

capture a second image of the dental tissue under the second light using the imaging unit;

determine a first red value and a first green value associated with a point on the dental tissue as shown in the first image;

determine a second red value and a second green value associated with the point on the dental tissue as shown in the second image;

create a third image of the dental tissue, where a portion of the third image depicting the point on the dental tissue is adapted using a function of:

the ratio of the second red value to the first red value, times

the ratio of the first green value to the second green value.

3. A system for visually examining dental tissue, comprising:

a first light source having a first peak wavelength;

a second light source having a second peak wavelength that is at least 10 nm longer than the first peak wavelength;

a processor;

an imaging unit; and

a memory in communication with the processor, the memory storing programming instructions executable by the processor to:

capture a first image of dental tissue under the first light using the imaging unit;

capture a second image of the dental tissue under the second light using the imaging unit;

determine a first red value and a first green value associated with a point on the dental tissue as shown in the first image;

determine a second red value and a second green value associated with the point on the dental tissue as shown in the second image;

create a third image of the dental tissue, where a portion of the third image depicting the point on the dental tissue is adapted using a function of G_{pix}, where α is a scaling constant, β is a constant that biases G_{pix} to a desired range, and

$$G_{pix} = \left(1 - \frac{R_{450nm}}{R_{405nm}} \cdot \frac{G_{405nm}}{G_{450nm}} + \beta\right) \cdot \alpha$$

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4. The system of claim 3, wherein in portions of the third image in which G_{pix} exceeds a predetermined threshold, the adaptation increases the brightness of such portions relative to the remaining portions of the third image.

5. The system of claim 3, wherein in portions of the third image in which G_{pix} exceeds a predetermined threshold, the adaptation increases the intensity in the red color channel of such portions relative to the remaining portions of the third image.

6. The system of claim 1, wherein the adaptation is a change to a hue, alpha value, or brightness of the portion of the third image.

7. The system of claim 1,

further comprising a display; and

wherein the programming instructions are further executable by the processor to show the third image on the display.

8. The system of claim 1,

further comprising a nonvolatile storage device; and

wherein the programming instructions are further executable by the processor to save the third image to the nonvolatile storage device.

9. The system of claim 1, wherein:

the first peak wavelength is at least 400 nm and not more than 410 nm; and

the second peak wavelength is at least 415 nm and not more than 500 nm.

10. The system of claim 1, wherein:

the first peak wavelength is about 405 nm; and

the second peak wavelength is about 450 nm.

11. A method of observing dental tissue, comprising:

illuminating the dental tissue with a first light having a first peak wavelength and capturing a first image of the dental tissue;

illuminating the dental tissue and a second light having a second peak wavelength and capturing a second image of the dental tissue;

determining a first red value and a first green value associated with a point on the dental tissue as shown in the first image;

determining a second red value and a second green value associated with the point on the dental tissue as shown in the second image;

creating a third image of the dental tissue, where a portion of the third image depicting the point on the dental tissue is adapted using a modification function that is a function of both

(i) a ratio of the second red value to the first red value; and

(ii) a ratio of the first green value to the second green value.

12. A method of observing dental tissue, comprising:

illuminating the dental tissue with a first light having a first peak wavelength and capturing a first image of the dental tissue;

illuminating the dental tissue and a second light having a second peak wavelength and capturing a second image of the dental tissue;

determining a first red value and a first green value associated with a point on the dental tissue as shown in the first image;

determining a second red value and a second green value associated with the point on the dental tissue as shown in the second image;

creating a third image of the dental tissue, where a portion of the third image depicting the point on the dental tissue is adapted using a modification function that is a function of:

the ratio of the second red value to the first red value, times

the ratio of the first green value to the second green value.

13. A method of observing dental tissue, comprising:

illuminating the dental tissue with a first light having a first peak wavelength and capturing a first image of the dental tissue;

illuminating the dental tissue and a second light having a second peak wavelength and capturing a second image of the dental tissue;

determining a first red value and a first green value associated with a point on the dental tissue as shown in the first image;

determining a second red value and a second green value associated with the point on the dental tissue as shown in the second image;

creating a third image of the dental tissue, where a portion of the third image depicting the point on the dental tissue is adapted using a modification function that is a function of G_{pix}, where α is a scaling constant, β is a constant that biases G_{pix} to a desired range, and

$$G_{pix} = \left(1 - \frac{R_{450nm}}{R_{405nm}} \cdot \frac{G_{405nm}}{G_{450nm}} + \beta\right) \cdot \alpha$$

14. The method of claim 13, wherein the adaptation is to increase the brightness of portions of the third image in which G_{pix} exceeds a predetermined threshold.

15. The method of claim 13, wherein the adaptation is to increase the intensity in the red color channel of portions of the third image in which G_{pix} exceeds a predetermined threshold.

16. The method of claim 11, wherein the adaptation is a change to a hue, alpha value, or brightness of the portion of the third image.

17. The method of claim 11,

further comprising a display; and

wherein the programming instructions are further executable by the processor to show the third image on the display.

18. The method of claim 11,

further comprising a nonvolatile storage device; and

wherein the programming instructions are further executable by the processor to save the third image to the nonvolatile storage device.

19. The method of claim 11, wherein:

the first peak wavelength is at least 400 nm and not more than 410 nm; and

the second peak wavelength is at least 415 nm and not more than 500 nm.

20. The method of claim 11, wherein:

the first peak wavelength is about 405 nm; and

the second peak wavelength is about 450 nm.