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# Mobile Device Quantification of Lateral Flow Tests: Modular illumination and sensor chamber (US patent US20160131592A1)

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Embodiments described are generally directed to a test sample apparatus. The test sample apparatus generally comprises a holder base arranged that accommodates a tablet or cell phone. The apparatus has a hood that is placed over a portion of the tablets illuminating touchscreen such that the illuminating touchscreen provides light that can be collected by the hood. There is a chamber integrated with the hood adapted to accommodate a chemically activated test strip. The chemically activated test strip is illuminated when the hood collects light from the illuminating touchscreen. A lens in the hood interposed between the camera and the test strip enables the camera to focus on a portion of the chemically activated test strip when the hood is placed over the portion of the

illuminating touchscreen.

The following are the claims from the inventor, Donald C. Coopeer Ph.D. as referenced

<https://patents.google.com/patent/US20160131592A1/en>

#### Claims(20)

What is claimed is:

1. A test sample apparatus comprising:a holder base arranged to accommodate and conform to at least a portion of a handheld electronic device, the handheld electronic device possessing a front surface having an illuminating touchscreen and a camera, the handheld electronic device possessing a back surface and essentially four sides; a hood adapted to be placed over a portion of the illuminating touchscreen, when placed over the portion of the illuminating touchscreen the hood collects light from the illuminating touchscreen when activated; a chamber integrated with the hood adapted to accommodate a chemically activated test strip, the chamber adapted to funnel light to the chemically activated test strip when the hood collects light from the illuminating touchscreen; and a lens in the hood interposed between the camera and the test strip, the lens adapted to focus the camera on a portion of the chemically activated test strip when the hood is placed over the portion of the illuminating touchscreen.
2. The test sample apparatus ofclaim 1 wherein the handheld electronic device is in possession of a photograph of the chemically activated test strip taken by the camera while the hood is placed over the portion of the illuminating touchscreen when illuminated.
3. The test sample apparatus ofclaim 2wherein the handheld electronic device evaluates the photograph.
4. The test sample apparatus ofclaim 2wherein the chemically activated test strip possesses fully developed test lines and control lines.
5. The test apparatus ofclaim 1 wherein the holder base surrounds the four sides and the back surface.
6. The test apparatus ofclaim 1 further comprising a hinge system that pivots the hood over the portion of the illuminating screen.
7. The test apparatus ofclaim 1 wherein the lens changes magnification, focal length or both the magnification and the focal length of an image taken by the camera.
8. The test apparatus ofclaim 1 wherein the handheld electronic device provides a specific light wavelength or wavelengths required to develop the chemically activated test strip.
9. The test apparatus ofclaim 1 wherein the chemically activated test strip develops biologic samples.
10. The test apparatus ofclaim 1 wherein the chemically activated test strip is disposed in a strip holder that is engaged with the chamber.
11. A method comprising:providing a handheld electronic device possessing a front surface having an illuminating touchscreen and a camera;  
placing the handheld electronic device in a case that conform to at least a portion of the handheld electronic device, the case does not obstruct the illuminating touchscreen and the camera;  
positioning a light collecting hood over a portion of the illuminating touchscreen that when positioned inherently aligns a lens with the camera, the lens comprised by the light collecting hood;  
placing a chemically activated test strip in a chamber integrated with the light collecting hood, the lens located between the camera and the chemically activated test strip;  
illuminating the chemically activated test strip by illuminating the touchscreen;  
taking a picture with the camera of the illuminated chemically activated test strip after the chemically activated test strip is developed; and  
determining results of the developed chemically activated test strip via the picture retained by the camera.
12. The method ofclaim 11further comprising developing the chemically activated test strip via a specific spectrum of light generated by the illuminating touchscreen.
13. The method ofclaim 11further comprising locking the light collecting hood to the case prior to the illuminating step.
14. The method ofclaim 11further comprising disposing the chemically activated test strip in a tester holder that is placed in the chamber.
15. The method ofclaim 11further comprising storing the picture in non-transitory memory in the handheld electronic device.
16. The method ofclaim 15wherein the determining step includes comparing intensity of a test line in the picture with a pre-established curve of test line intensities.
17. The method ofclaim 11wherein the positioning the light collecting hood over the portion of the illuminating touchscreen is accomplished by pivoting the light collecting hood about at least one hinge.
18. A test sample apparatus comprising:a protective case adapted to accommodate a handheld electronic device, the handheld electronic device possessing a front surface having an illuminating touchscreen and a camera that are not obstructed by the protective case;  
means for positioning a light collecting hood over a portion of the illuminating touchscreen that when positioned inherently aligns a lens with the camera;

means for placing a chemically activated test strip in a chamber integrated with the light collecting hood;  
means for illuminating the chemically activated test strip via the handheld electronic device;  
means for taking a picture of the illuminated chemically activated test strip; and  
means for determining results of the chemically activated test strip.

**19.** The test sample apparatus of claim 18 further comprising locking the light collecting hood to the protective case.

**20.** The test sample apparatus of claim 18 further comprising means for focusing chemically activated test strip with the camera.