WHAT IS CLAIMED IS:

1. A multi-channel fluorescence detection device, comprising:

an illumination module including at least one light source, plural different types of excitation filters, and a first rotational drum, wherein the light source provides a broad band illumination, each of the excitation filters passes light at a particular band width for exciting a targeted fluorescent probe, and the first rotational drum drives the excitation filters;

plural heating chambers adapted for accommodating PCR tubes having samples and the targeted fluorescent probes;

a detection module including plural different types of emission filters, a second rotational drum and at least one photo-detector, wherein each of the emission filters passes light at a particular band width, the second rotational drum drives the emission filters, and the photo-detector receives fluorescent signals and converts the fluorescent signals to electrical signals; and

a transmission module including an actuator connecting with the first and the second rotational drums to drive rotations of the first and the second rotational drum simultaneously for switching and synchronizing the excitation filters and the emission filters to match specific wavelengths of the targeted fluorescent probes.

2. The multi-channel fluorescence detection device according to claim 1 wherein the light source is a white light LED.

3. The multi-channel fluorescence detection device according to claim 1 wherein the illumination module further comprises at least one collimating lens located between the light source and the excitation filter.

4. The multi-channel fluorescence detection device according to claim 1 wherein the excitation filter and the emission filer are band pass filters.

5. The multi-channel fluorescence detection device according to claim 1 wherein

the illumination module further includes a support and a control circuit board, the light source is mounted on the control circuit board, and the control circuit board is mounted on the support.

6. The multi-channel fluorescence detection device according to claim 1 wherein the illumination module further comprises at least one converging lens mounted between the excitation filter and the heating chamber.

7. The multi-channel fluorescence detection device according to claim 6 wherein the converging lens is mounted on a lens holder sitting on a top of the heating chambers.

8. The multi-channel fluorescence detection device according to claim 6 wherein the converging lens is a bi-convex lens.

9. The multi-channel fluorescence detection device according to claim 1 wherein each of the illumination module and the detection module further comprises plural filter mounts, and the same type of excitation filters or emission filters are installed in the same filter mount.

10. The multi-channel fluorescence detection device according to claim 1 wherein each of the first and the second rotational drum is substantially shaped as an octagonal column.

11. The multi-channel fluorescence detection device according to claim 1 wherein each of the first and the second rotational drum further comprises a position stop disposed on a side panel thereof.

12. The multi-channel fluorescence detection device according to claim 11 wherein the transmission module further comprises a position plate configured to be against the position stops of the first and the second rotational drums for securing initial positions of the first and the second rotational drums.

13. The multi-channel fluorescence detection device according to claim 1 wherein

the plural heating chambers are positioned linearly for batch process.

14. The multi-channel fluorescence detection device according to claim 1 further comprising a thermoelectric cooling heater for heating the PCR tubes.

15. The multi-channel fluorescence detection device according to claim 1 wherein the detection module further comprises at least one converging lens mounted between the heating chamber and the emission filter.

16. The multi-channel fluorescence detection device according to claim 1 wherein the detection module further comprises at least one converging lens mounted between the emission filter and the photo-detector.

17. The multi-channel fluorescence detection device according to claim 1 wherein the detection module further includes an electromagnetic (EMI) shielding and grounding structure covering the photo-detector.

18. The multi-channel fluorescence detection device according to claim 1 wherein the actuator of the transmission module is a step motor mounted behind the light source.

19. The multi-channel fluorescence detection device according to claim 18 wherein the step motor rotates 45 degree one at a time.