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Real-Time Base Line Correction Method

The generation and recombination of mobile charge carriers (electrons and electron holes) are two vital fundamental processes determining semiconductor performance. The minority character lifetime is a measurement of the recombination and generation rates of mobile charge carriers. Time-resolved Photoluminescence (TRPL) is a measurement of the minority carrier lifetime. Conventional infrared TRPL systems are available to measure voltage signals across a semiconductor, but the signal-to-noise ratio is too low to resolve the infrared photoluminescence decay. Therefore, there is a need for a method of analyzing the noise sources in TRPL systems and modifying the systems to reduce the noise and thus improve the signal-to-noise ratio.

Researchers at Arizona State University have discovered an experimental method for analyzing TRPL measurements to improve the signal-to-noise ratio. A "double-modulation" method modulates the signal, which suppresses low frequency noise in time-resolved photoluminescence measurements. In contrast, traditional methods measure the signal directly. Double-modulation increases measurement speed and can be realized much more inexpensively than standard methods for TRPL experiments. The principles used in this invention can also be applied to suppress the noise in any measurement when the noise is dominated by low frequency noises.

Potential Applications

- Measurement Techniques
- Optoelectronics
- Characterization of optical materials
- LEDs
- Semiconductor lasers

Benefits and Advantages

- Versatility - Applicable to time-varying signals
- Improved accuracy –
  - Reduces noise
  - Removes baseline-drift
- Low Cost – can easily and inexpensively be integrated into existing infrastructure

For more information about the inventor(s) and their research, please see

Dr. Yong-Hang Zhang's directory webpage