

# Femtosecond Optical Kerr Effect for Biological Application

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The Optical Kerr Effect (OKE) is a non-linear optical phenomenon in which an intense electric field induces a birefringence in the sample causing changes to the non-linear index ( $n_2$ ). The OKE is attributed to the distortion of the bound and free electrons and the disturbance of the molecular motions in a material.

Our work proposes the OKE as a potentially new method to differentiate different types of tissues through key biomarkers from the temporal profile. The primary biomarker observed in our study comes from the double peak temporal Kerr structure signal, which we first observed in breast chicken tissue and human brain tissue. The second and most important biomarker is the doubling in the tissue's conductivity. For example, a cancerous breast tissue was shown to be about twice as conductive as healthy tissue depending on its grade. In general, our finding suggests conductivity from electrons and ions in plasma in a tissue can be used as a new major biomarker for the classification or detection of diseases. Our methods can be potentially used for differentiating other diseases such as neurological diseases.

## Type of presence

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