Martin J vandeVen, Beniamino B Barbieri, Enrico Gratton, and William W Mantulin.

Digital acquisition for multi-frequency phase and modulation spectroscopy: advantages over analog detection.

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Abstract

Multi-frequency phase and modulation fluorometry/phosphorimetry with digital acquisition capability has recently been introduced (B. Feddersen et. al., Biophys. J. 53 (1988) 404a and Rev. Sci. Instrum. 60 (1989) 2929-2936.). The improvement in signal-to-noise ratio and the accompanied decrease in data collection time, make this technique excellently suited for fast kinetics measurements on a time scale of several msec. Other advantages are the large dynamic range and linear response reducing the need for careful matching of sample and (standard) reference intensity. Increased sensitivity allows data collection with modulation values more than an order of magnitude smaller as previously observed. Cross-correlation frequencies, selected under software control, can be located well above the influence of major noise sources. Results obtained for various standard fluorophores and protein samples with digital signal sampling are compared with those obtained with analog detection.