Time-Domain Lifetime Measurements on ChronosBH

Yuhua Ni and Ewald Terpetschnig
ISS, Inc.

Introduction

ChronosBH is the first of a new ISS product line of time-domain fluorimeters. ChronosBH combines proven ISS technology and Becker & Hickl components for precise TCSPC measurements using laser diodes, Ti-Sapphire, white and other pulsed lasers as light sources. It features parallel beam geometry and can be upgraded to perform steady state and time-resolved measurements. ChronosBH is fully automated using Vinci – Multidimensional Fluorescence Spectroscopy, a Windows-based software that enables complete remote instrument control and data analysis.

To demonstrate the capabilities of ChronosBH we have measured several fluorescent standards using a pulsed 447-nm laser diode light source.

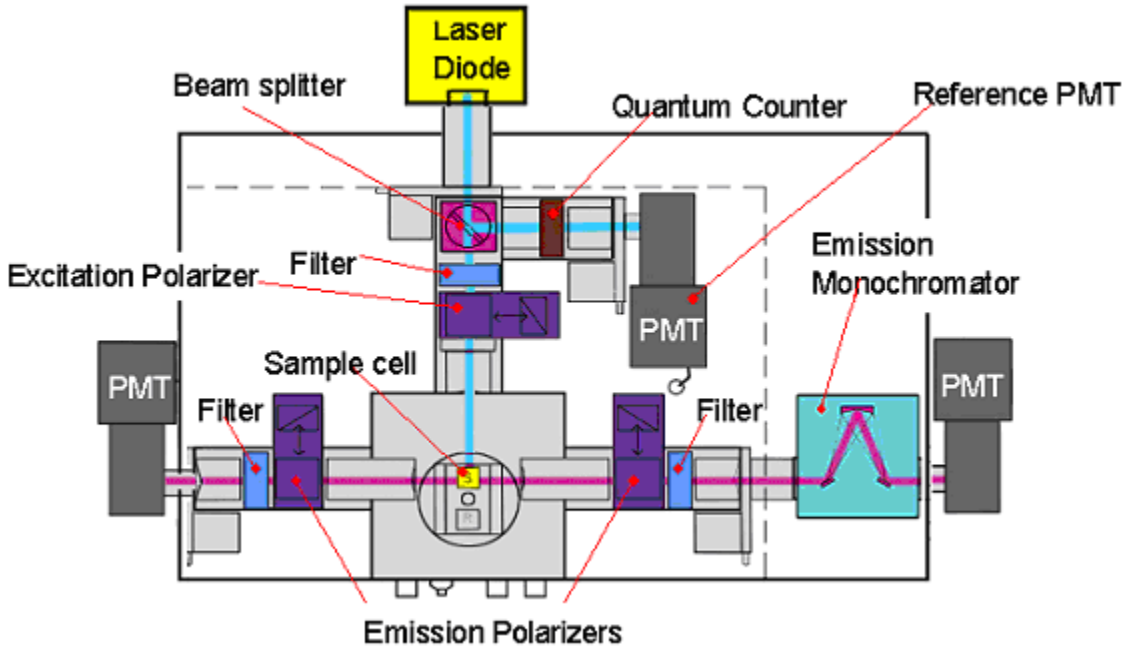

Figure 1. Schematic Drawing of ChronosBH, the time-domain fluorometer from ISS.

Experimental Data

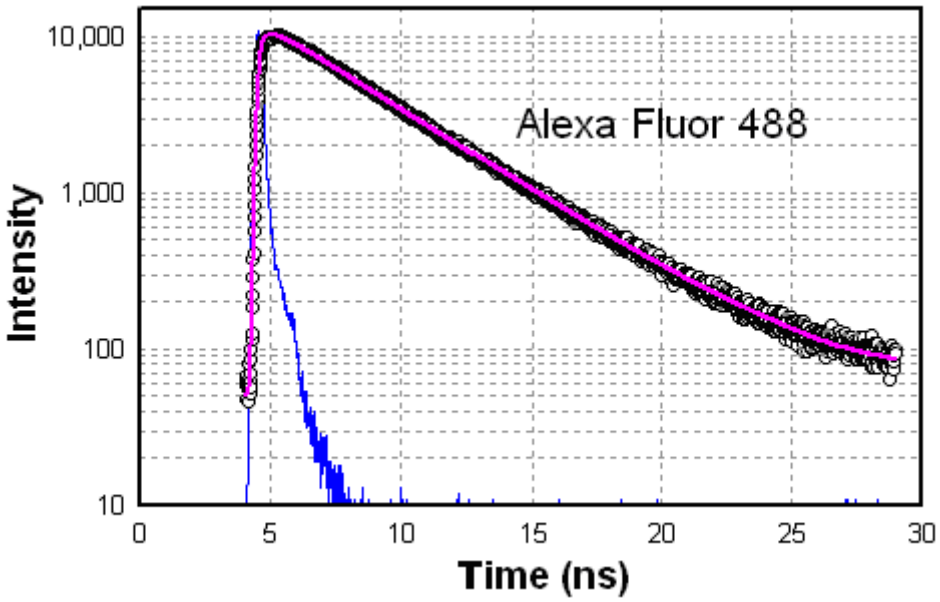

Figure 2. Time-domain intensity decay of Alexa 488 in water acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 4.05 ns (x^2 = 1.1).

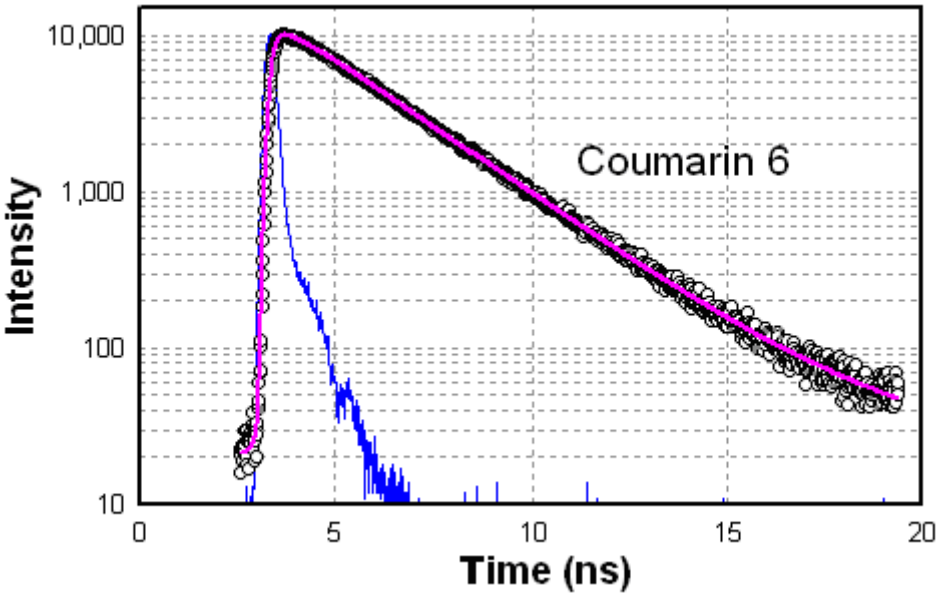

Figure 3. Time-domain intensity decay of Coumarin 6 in Ethanol acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 2.49 ns (x^2 = 1.4).

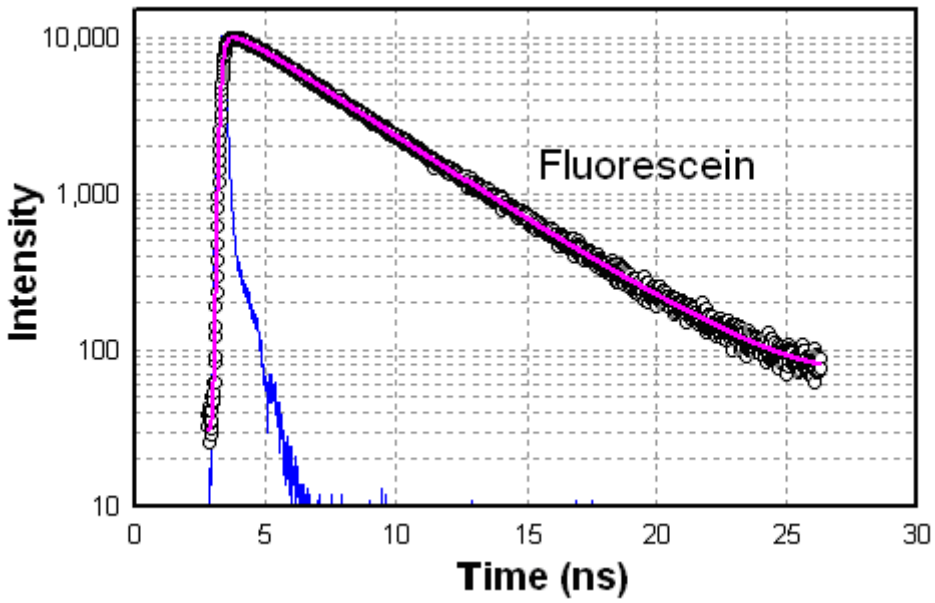

Figure 4. Time-domain intensity decay of Fluorescein in PB 7.4 acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 4.0 ns (x^2 = 1.2).

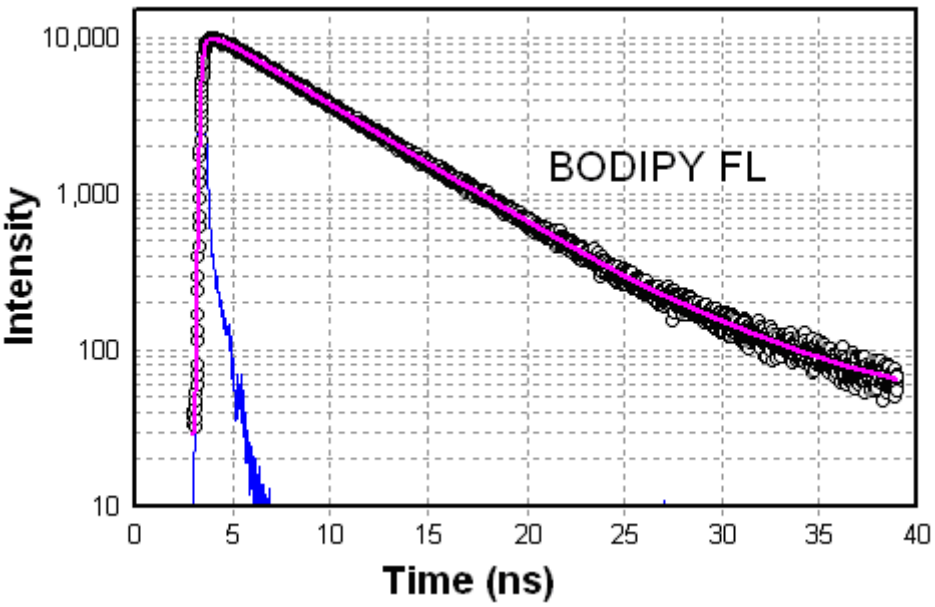

Figure 5. Time-domain intensity decay of Bodipy Fl in water acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 5.66 ns (x^2 = 1.12).

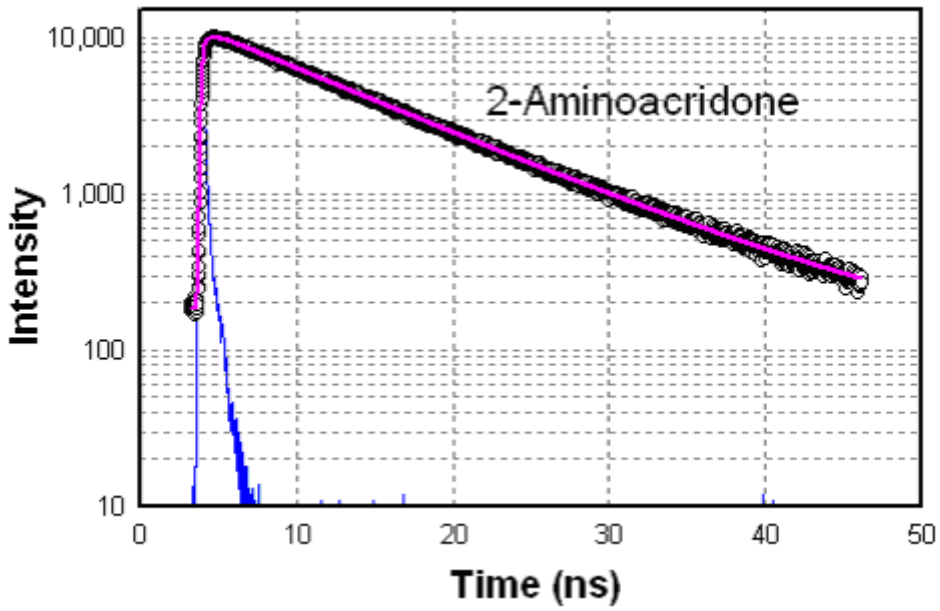

Figure 6. Time-domain intensity decay of 2-Aminoacridone in water acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 10.3 ns ($x^2 = 1.05$).

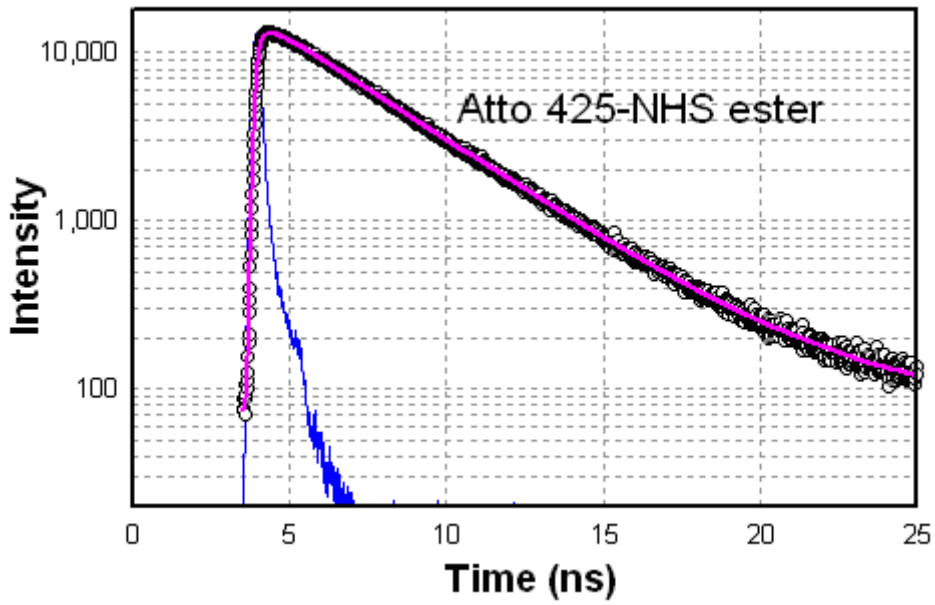

Figure 7. Time-domain intensity decay of Atto 425-NHS ester in water acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 3.5 ns ($x^2 = 1.11$).

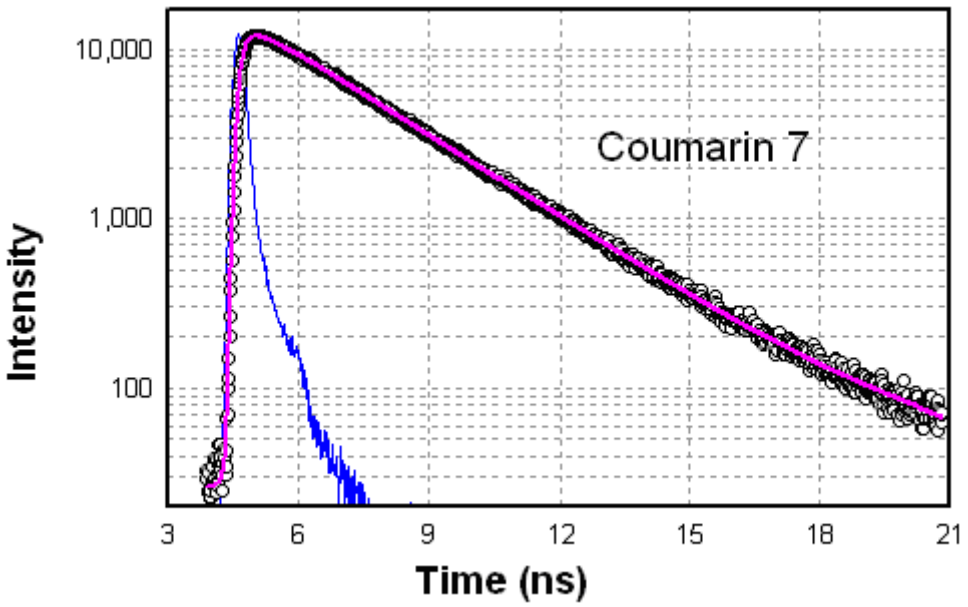

Figure 8. Time-domain intensity decay of Coumarin 7 in EtOH acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 2.66 ns ($x^2 = 1.13$).

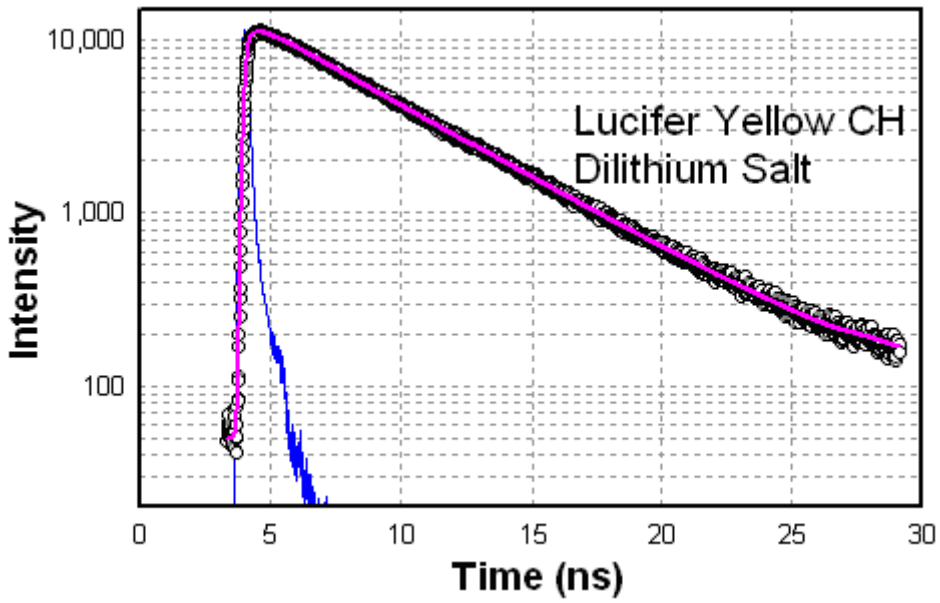

Figure 9. Time-domain intensity decay of Lucifer Yellow CH Dilithium Salt in water acquired on ChronosBH using a 447-nm pulsed laser diode. The emission was collected through a long pass filter KV 505. The data is best fitted by a single exponential decay time of 5.07 ns ($x^2 = 1.07$).