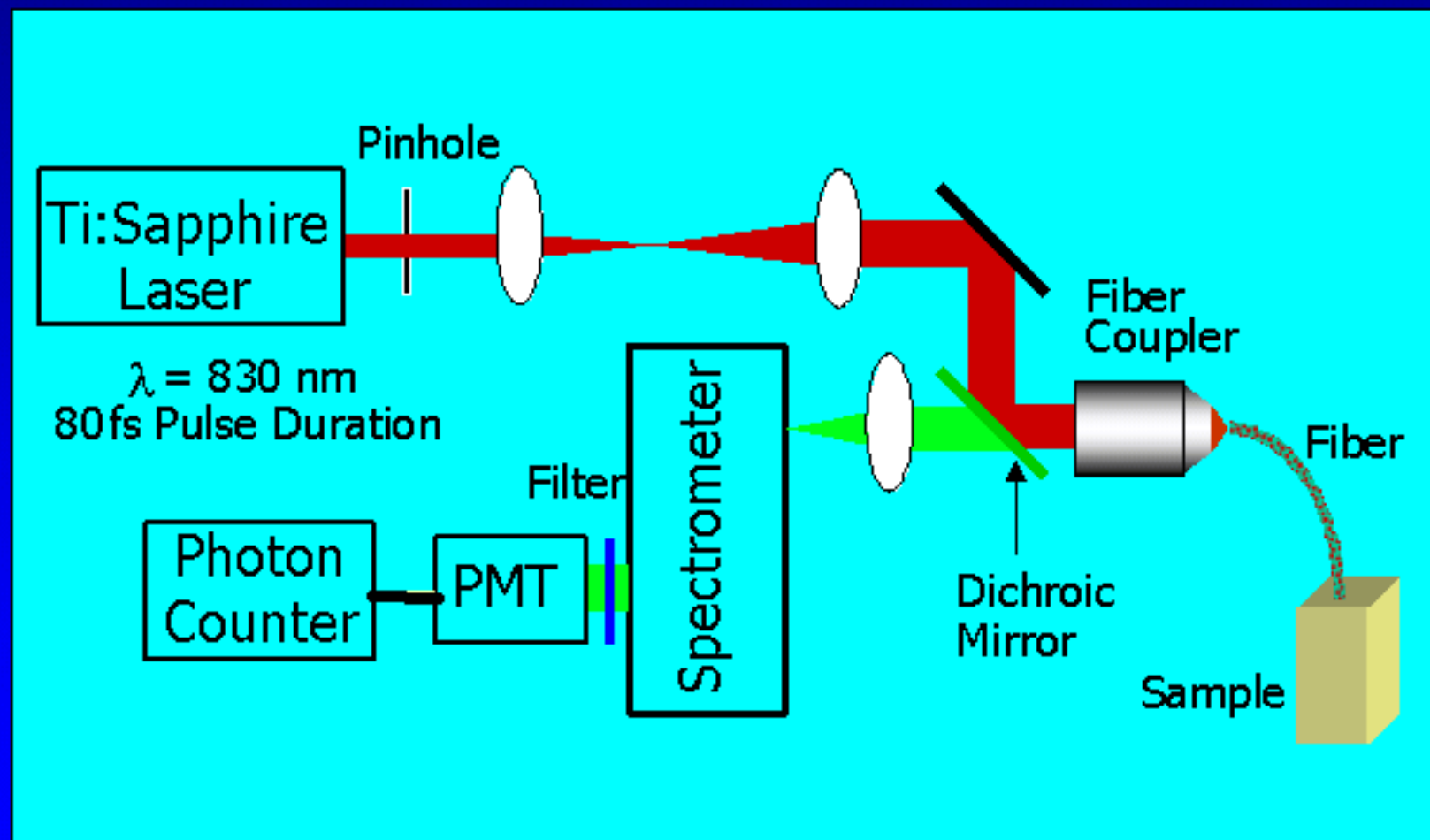


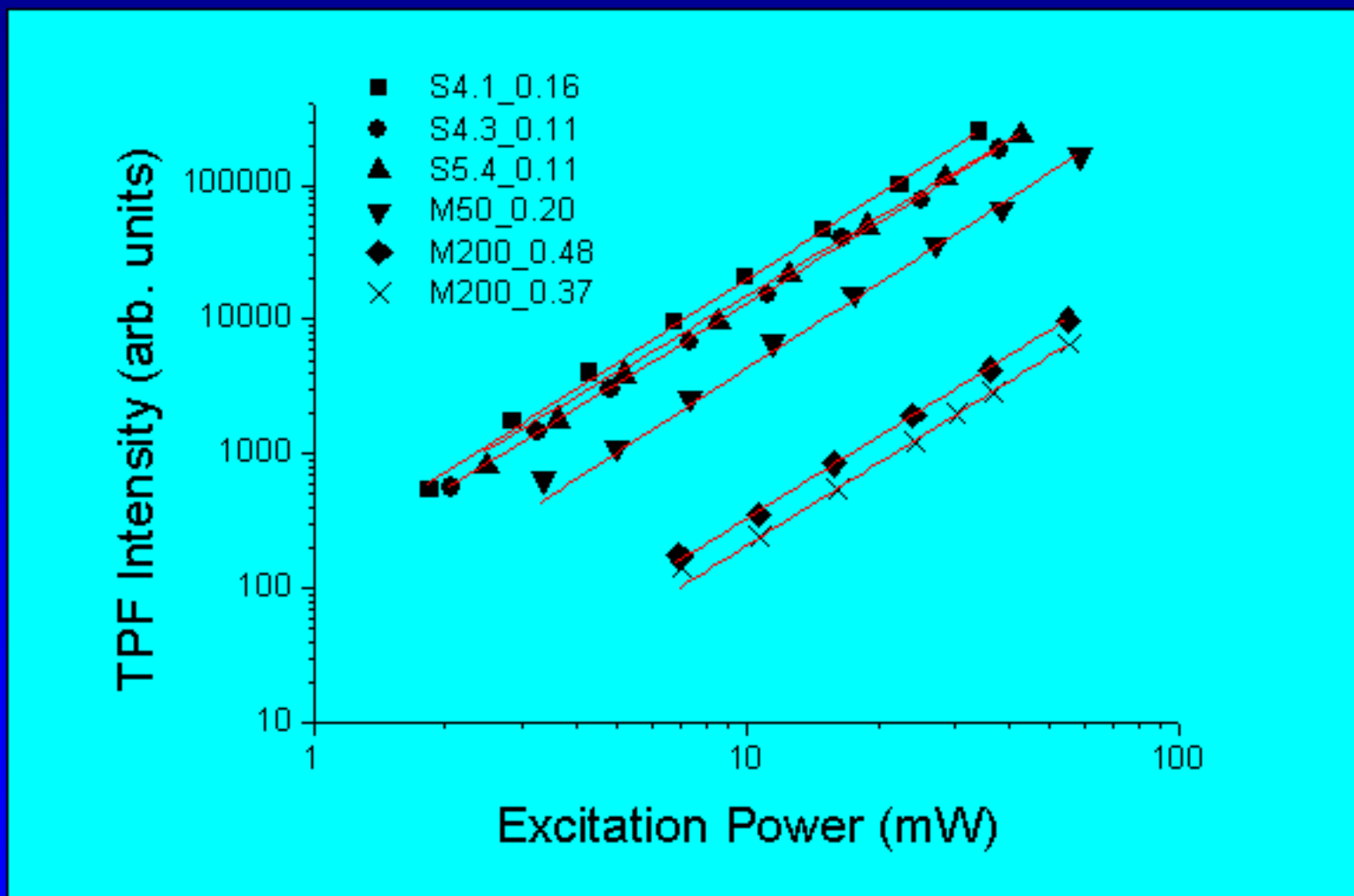
Fiber-Optic Biosensing

We have been developing a biosensing technique based on two-photon fluorescence detection through optical fibers. The primary goal is to perform real-time monitoring of the uptake of a targeted drug delivery *in vivo*.

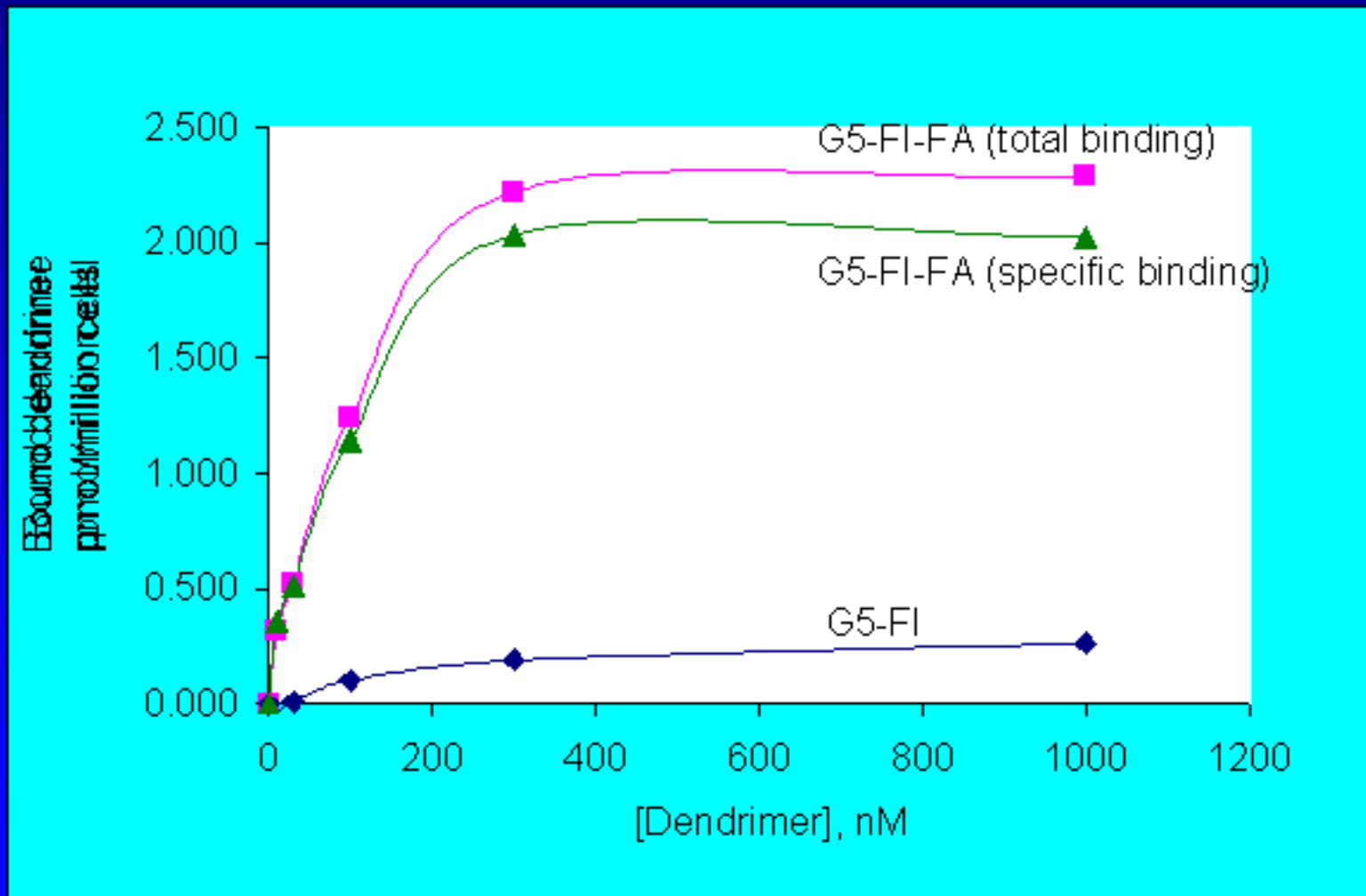
Biosensing based on two-photon fluorescence detection through an optical fiber



Two-Photon Fluorescence Detection Efficiency of Different Fibers



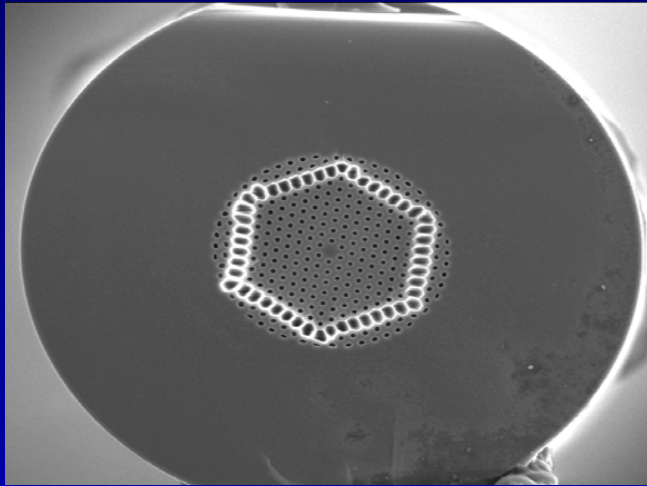
Determination of binding of G5-FI and G5-FI-FA to KB cells



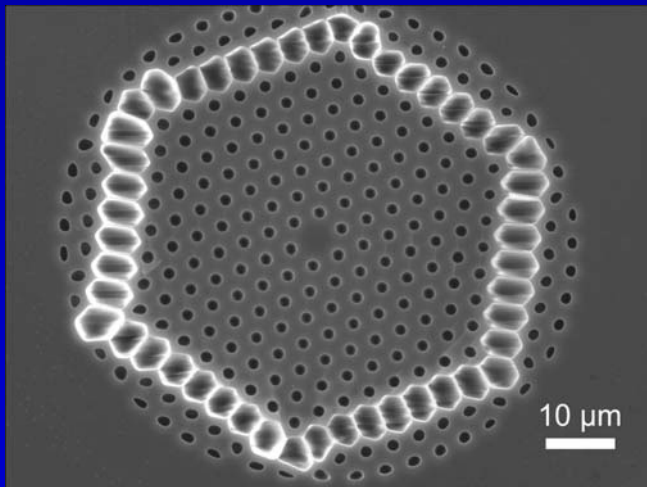
Enhanced biosensing with double-clad photonic crystal fibers

To improve the sensitivity of our fiber probe, we have shown that a double-clad photonic crystal fiber can be used. By propagating single mode down the central core of the fiber, we can maintain the high excitation efficiency, and by using the high numerical aperture of the outer core, we can increase the collection efficiency.

Double-clad Photonic Crystal Fiber

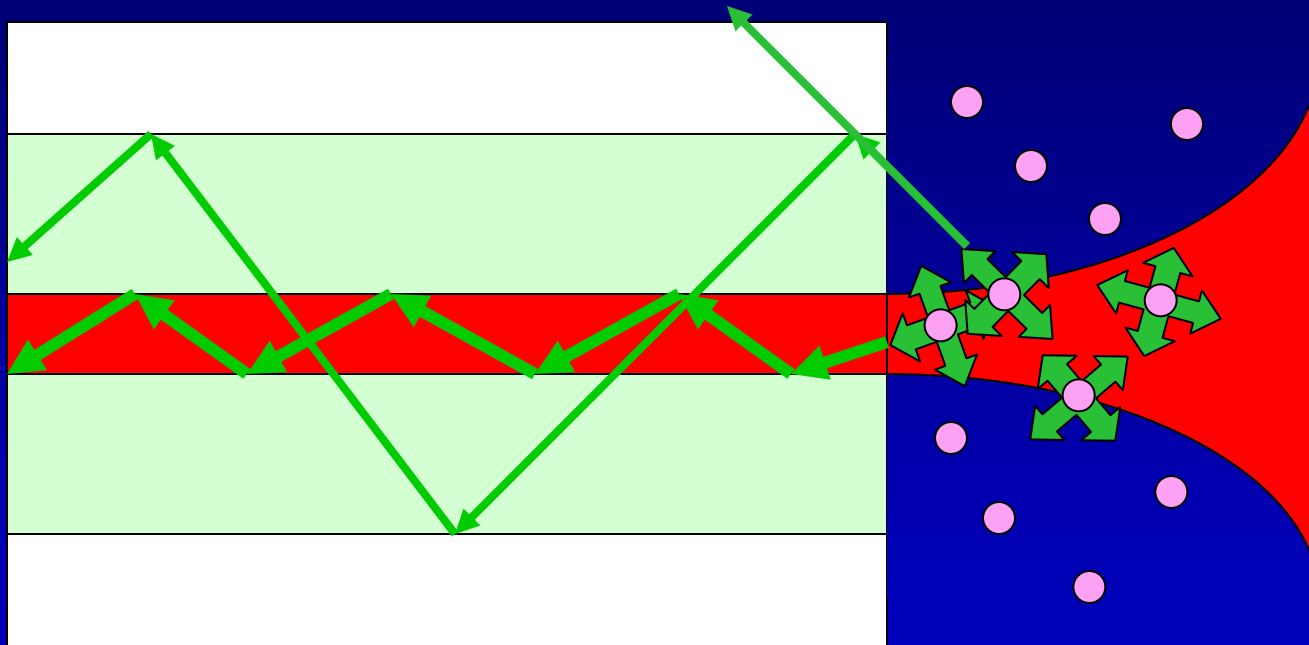


Top: Air clad PCF fiber with
undoped central core
Fiber OD 200 μ m



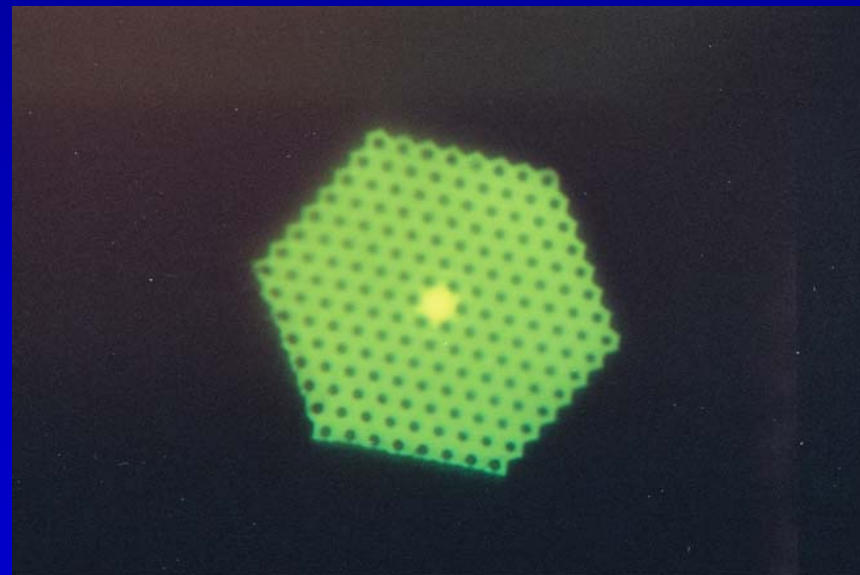
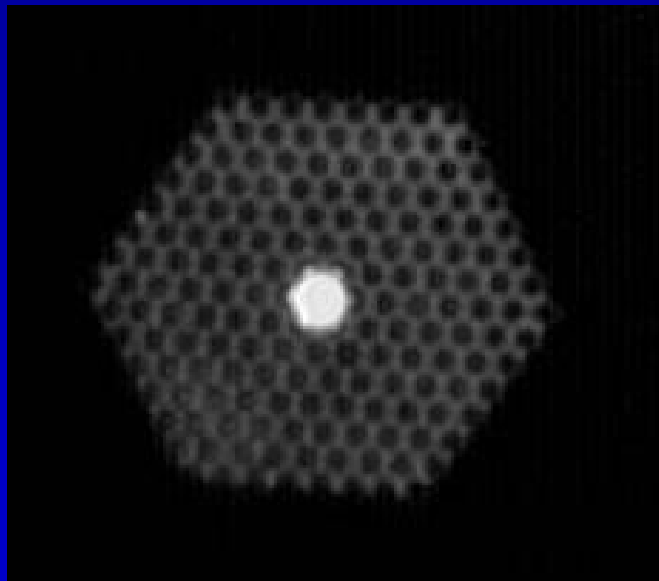
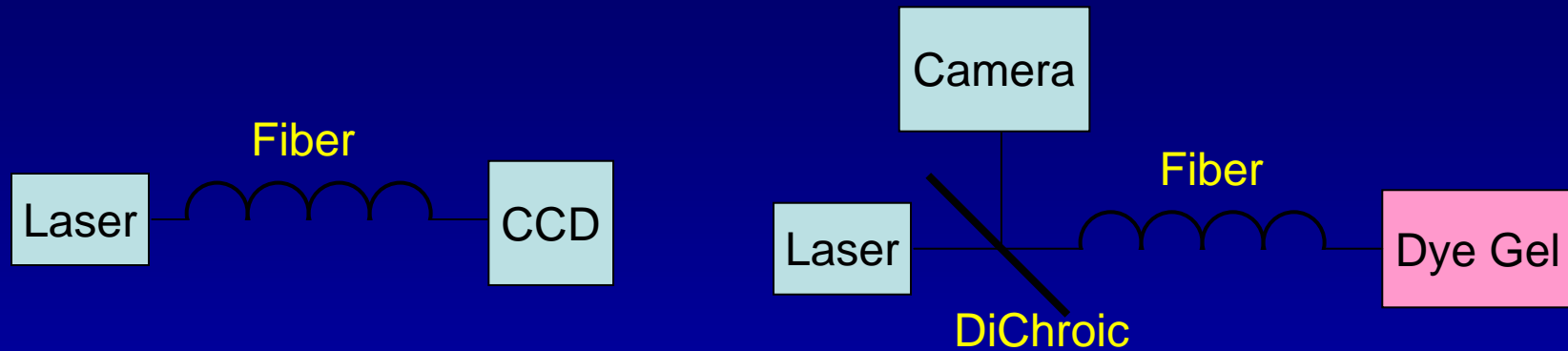
Bottom: Central region
60 μ m across flats
Core diameter 6.3 μ m
Period 3.8 μ m
 δ/Λ 0.4

Fluorescence Collection

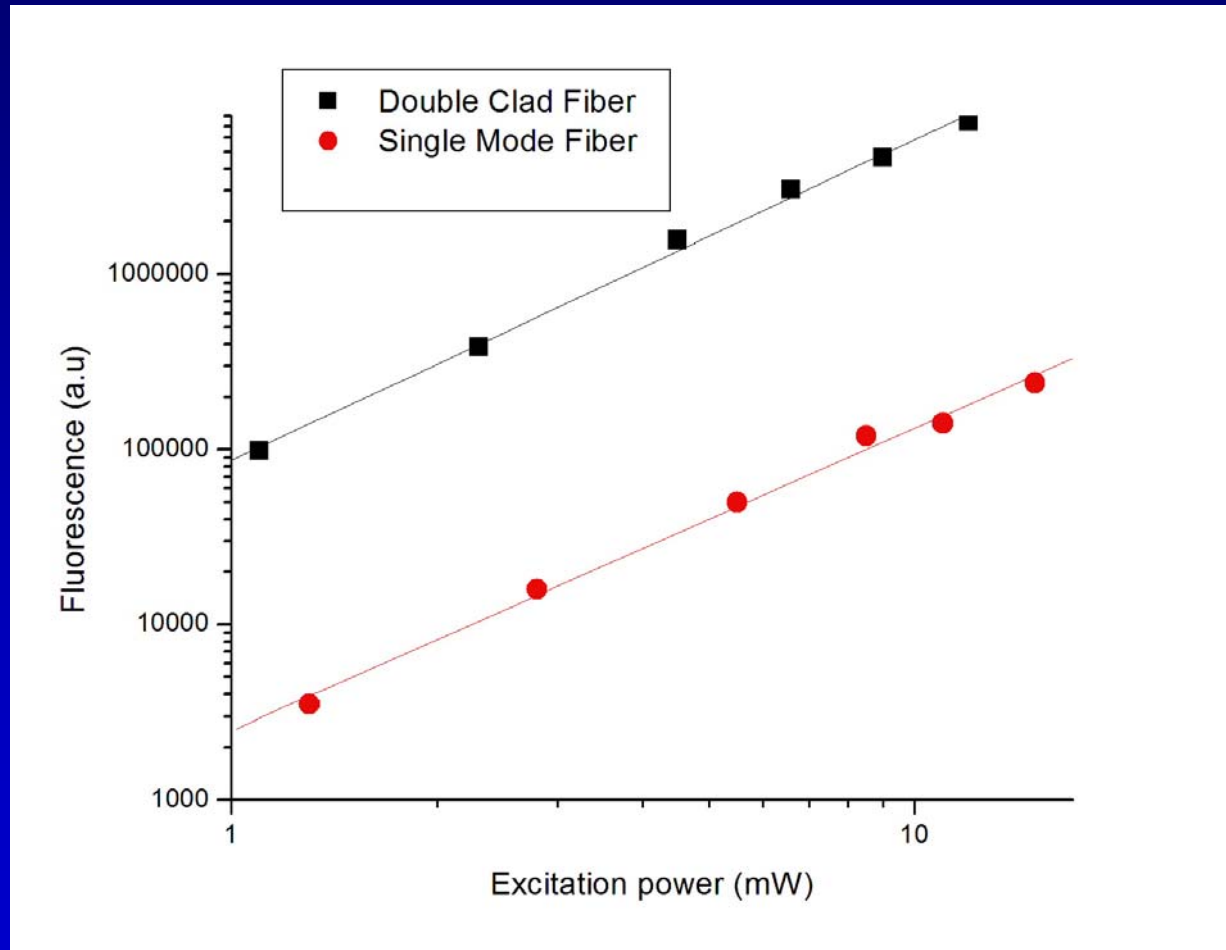


The outer core will collect the fluorescence that will otherwise be lost due to the low numerical aperture of the central core.

Coupled light and fluorescence



Dual core vs. Single mode fiber



~40 times enhancement!