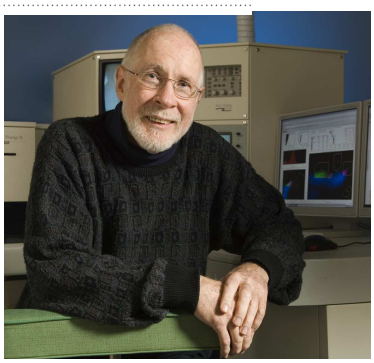
Carnegie Mellon

Department of Biological Sciences



Alan S. Waggoner

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Dr. Waggoner's research has focused on development of fluorescence-based detection systems for biology and biotechnology. The cyanine dye fluorescent labeling reagents developed in the laboratory have become widely used in industry and academic research for multicolor analysis of proteins, nucleic acids, cells and tissues with imaging microscopes and flow cytometers. Dr. Waggoner is currently leading the Molecular Biosensor and Imaging Center into development of microbiosensors for studying protein regulatory processes in living cells and tissues. The Center also has a NASA project for detecting sparse microorganisms in extreme environments.

In the new optical biosensor initiative, the Waggoner group and its collaborators is creating a fundamental sensor unit technology for a new and very broad class of biosensors. We envision this technology will provide a very powerful, and almost generic, tool for detecting a very wide range of important biological regulatory molecules, "target molecules", in cells and in the interstitial spaces between cells. The sensors are intended to sensitively and rapidly detect many targets simultaneously in a tissue.

The sensor units are generated by combining genetically engineered, target-binding proteins and environmentally sensitive fluorescent dyes that report target binding. The sensor units will be incorporated into intracellular sensors, sensor particles and optical fiber sensors for interstitial spaces in tissues, sensors on chips for in vitro assays, and sensors for high throughput automated homogeneous assays in pharmaceutical drug discovery.

Selected Publications

Szent-Gyorgyi C, Schmidt B, Creeger Y, Zakel K, Fisher G, Adler S, Woolford C, Fitzpatrick J, Yan Q, Vasilev K, Berget P, Bruchez M, Jarvik J, Waggoner A. Fluorogen activating proteins: Technology for imaging and assaying live cells. Nature Biotechnology, Vol 26, pp235-240, 2008.

Tsien RY, Ernst LA and Waggoner AS. Fluorophores for confocal microscopy: Photophysics and photochemistry. Pawley, J., Ed. Handbook of Confocal Microscopy. Plenum Press, NY, 351-365, 2006.

Lanni F, Pane DA, Weinstein SJ, Waggoner, AS. A compact flashlamp-based fluorescence imager for use under ambient-light conditions. The Review of Scientific Instruments 78:033702, 2007.

Smith JD, Melhem ME, Magge KT, Waggoner AS, Campbell PG. Improved growth factor directed vascularization into fibrin constructs through inclusion of additional extracellular macromolecules. Microvascular Research 73:84-94, 2007.

Patrick MJ, Ernst LA, Waggoner AS, Thai D, Tai D, Salama, G. Enhanced aqueous solubility of long wavelength voltage-sensitive dyes by covalent attachment of polyethylene glycol. Organic and Biomolecular Chemistry 5, 3347-3353, 2007.

Weinstein S, D. Pane D, Ernst L, Warren-Rhodes K, Dohm JM, Hock AN, Piatek JL, Emani S, Wagner M, Fisher G, Minkley E, Dansey L, Smith T, Grin E, Stubbs K, Thomas G, Cockell C, Marinangeli L,Ori GG. Heys S, Teza JP, Moersch JE, Coppin P, Chong Diaz G, Wettergreen DS, Cabrol NA, Waggoner AS. Application of pulsed-excitation fluorescence imager for daylight detection of sparse life in tests in the Atacama Desert. J. Geol. Res. In Press.

Ballou B, Ernst LA, Andreko S, Bruchez MP, Lagerholm CB, Waggoner AS. Long-term retention of fluorescent quantum dots in vivo. NATO Conference, In Press.