

## Temperature Gradient Handling System for Surface Plasmon Resonance (SPR) Measurements

### Technology

Researchers at the University of Wisconsin-La Crosse Chemistry and Biochemistry Department have developed a surface plasmon resonance (SPR) based method for measuring, in a single experiment, temperature dependence of binding kinetics and thermodynamics. The method is based on a novel sample handling system that generates a spatial temperature gradient across an SPR sensor. Quantitatively measuring the temperature dependence of molecular binding in a sensor format has been a longstanding challenge. This technology is a highly resolved approach for such a measurement and allows for quantitative measurement of binding kinetics for a span of temperatures instead of just a single temperature (e.g., room temperature) in real time. It also allows for an easy measurement of the thermal denaturation profile of DNA or protein. Preliminary analysis suggests this technology can be used as a research tool for SPR imaging and can be potentially useful for studying protein and DNA interactions with themselves, carbohydrates, RNA, antibodies, cells, peptides and polymers.

### Research and Development Status:

The instrumentation and corresponding methods have been developed and laboratory tested. Two prototype sample handling systems have been constructed. Both are fully functioning. The system has utility as a stand-alone instrument, however the design of the gradient stage has potential to be adaptable with other imaging SPR systems with further development. Studies are currently underway to optimize surface chemistry and instrumentation design.

### Applications and Key Benefits

- This novel sample handling system has utility as a new and improved research tool for SPR imaging enabling identification of thermal denaturation profiles for a host of biomolecular interactions;
- System is capable of generating a spatial temperature gradient across an SPR sensor within the range of 5°C to 90°C;
- Device provides for higher throughput and more comprehensive output as compared to differential scanning experiments (as entire temperature dependence is shown at once);
- System is capable of measuring temperature dependence of both sensor binding kinetics and strength, demonstrating evaluation of hybridization activity;
- End users will benefit from not only a reduction in time but also materials needed, providing for an overall increase in efficiency and reduction in net cost of each study performed.

### Intellectual Property & Related Publications:

U.S. Provisional (62/257876) filed on 11/20/2015

Wagner, C.E., Macedo, L.J.A., and A. Opdahl. Temperature Gradient Approach for Rapidly Assessing Sensor Binding Kinetics and Thermodynamics. *Analytical Chemistry*. In press. DOI: 10.1021/acs.analchem.5b01518

### Development and Commercialization Needs:

SPR is widely used in the pharmaceutical industry and academic laboratories to study binding interactions between potential drug candidates and biological molecules. WiSys is seeking an industry partner that markets or manufactures SPR instruments and is interested in co-development and/or collaboration. For more information on partnering opportunities, please contact Jennifer Cook at [jennifer@wisys.org](mailto:jennifer@wisys.org) or by phone at 608-316-4131.