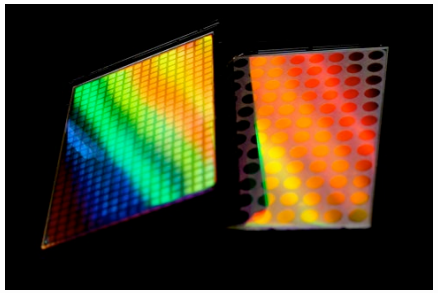
Magnusson entrepreneurial experience

- Co-founder and Chief Technical Officer, Resonant Optics Incorporated
- Co-founder and Chief Technical Officer, Resonant Sensors Incorporated
- Founder, Tiwaz Technologies LLC

RSI: provides next-generation optical sensor systems for pharmaceutical and biotech customers including COVID-19.

ResoSens™ bioassay system



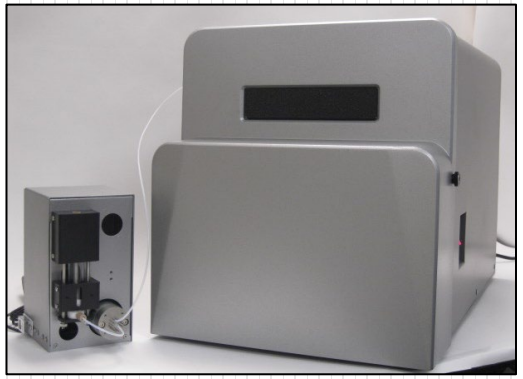
Bionetic microarray plates

Commercial system

Set Your Label Free

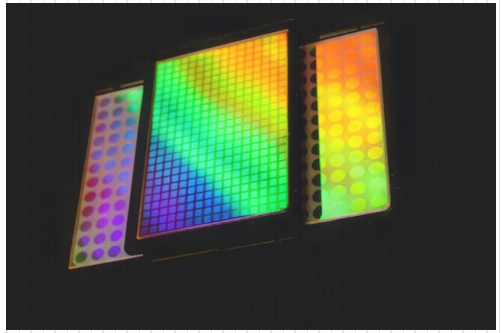
ResoSens™ system including ResoVu™ analysis software

- Label-free operation in a microarray format
- Automation compatible
- Windows 8 based, exportable CSV data files
- User selected plate layout and beam size—easy to use!

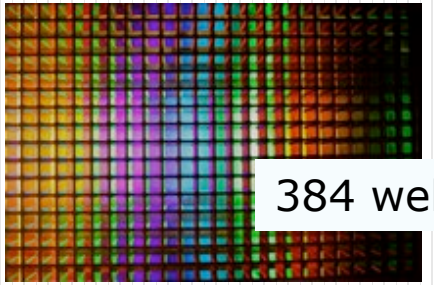


96- & 384-well microarray plates

- Bare and pre-activated
- Custom assay kits and/or reagents
- Method development and/or testing services
- Detect an array of analytes in a single well
  - custom multiplexed kits (4- or 8-plex)



96 wells
Scan <20 sec



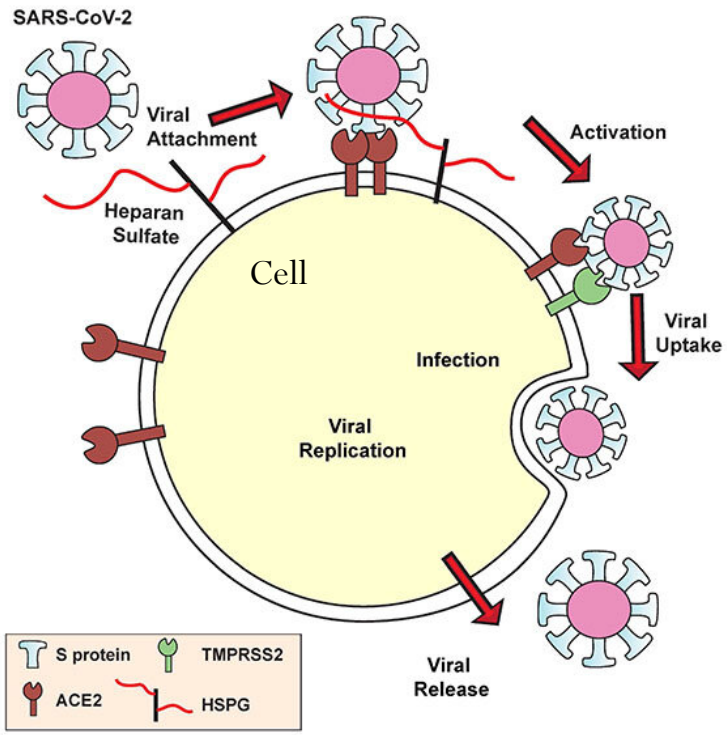
384 wells

Bionetic

http://resonantsensors.com/

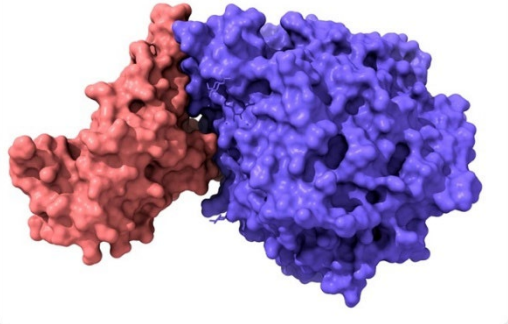
High-throughput ResoSens COVID-19 tests

- Patient serum/blood/saliva tests for antibodies against COVID-19 antigen
- Tests are performed using COVID-19 receptor binding domain (RBD) antigen.

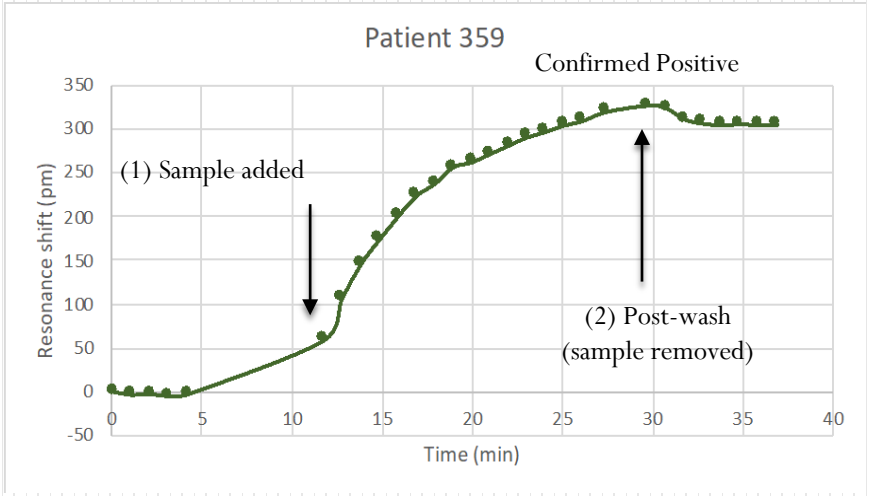


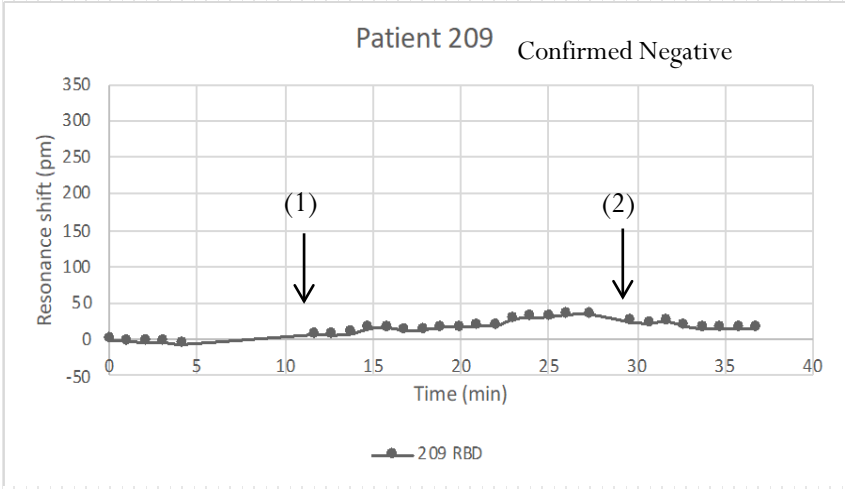
Scientists exploring how coronaviruses like COVID-19 infect human cells have shown that the **SARS-CoV-2 spike (S) glycoprotein binds to the cell membrane protein angiotensin-converting enzyme 2 (ACE2) to enter human cells.**

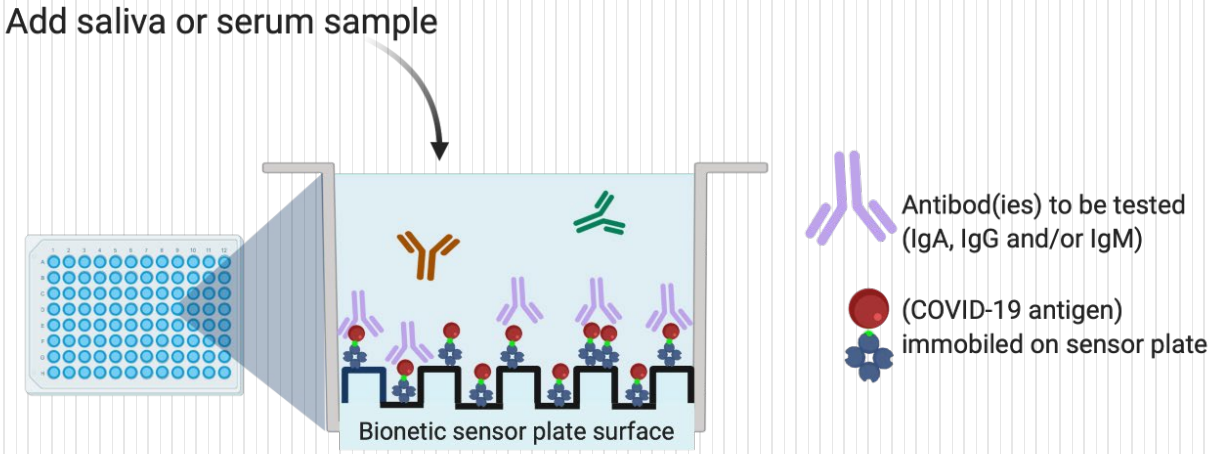
S-protein=Key **ACE2=Lock**



Patient serum testing for antibodies against the COVID-19 antigen (RBD)







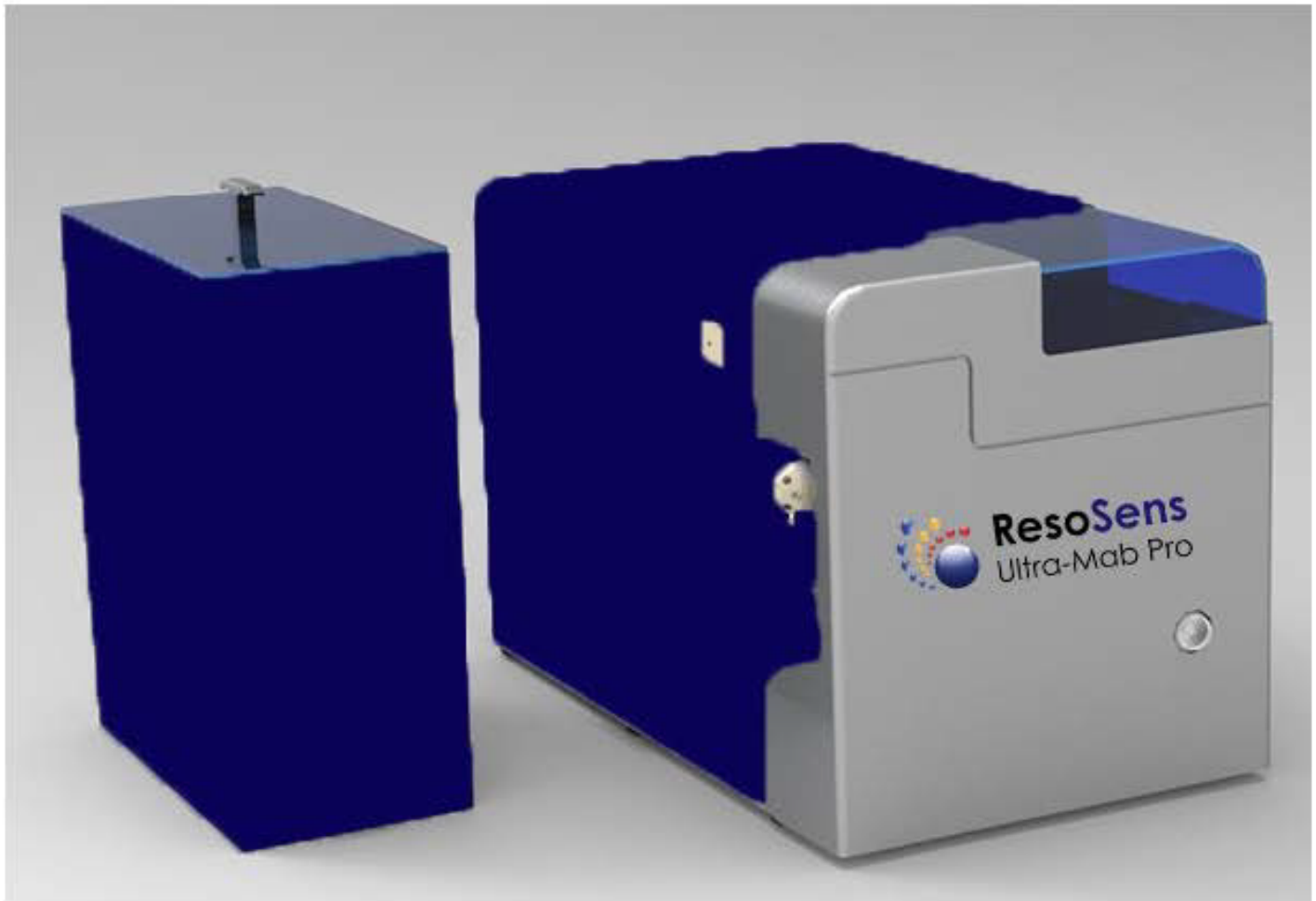
Results measured in quadruplicate and averaged.
Reference buffer subtracted from data.

4 wells/sample; 24 tests in a single run; ~30 minutes/run; <2 min/test

WORKS GREAT!

Serum sample diluted 1:10

New system design and color scheme



HEX color
0a014F
for metal
housing on
system and
incubator.

New project: LWIR optical components

Multi-layer film stacks versus single-layer resonance devices

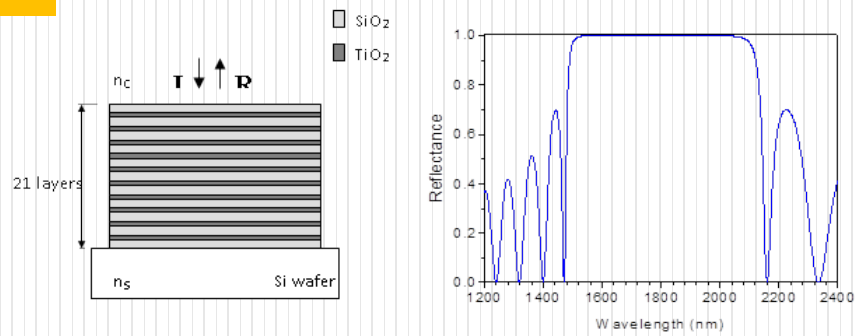


Fig. 2.9. (a) An example of a Bragg stack. Thicknesses, d (SiO_2) = 303.82 nm, d (TiO_2) = 180.04 nm; refractive indices n_c = 1.00, n (SiO_2) = 1.44, n (TiO_2) = 2.43, n_s = 3.46; incident angle ϑ_{in} = 0º, (b) Calculated spectral response of a Bragg stack for TE polarized waves.

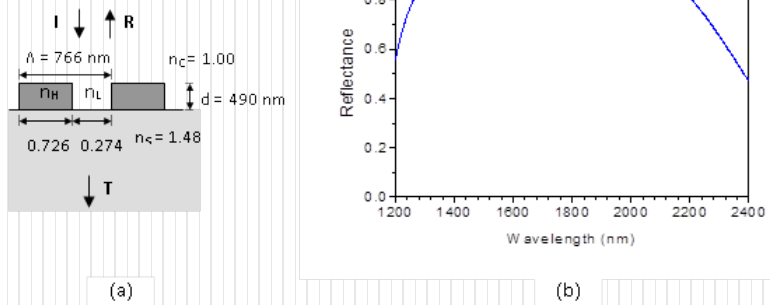
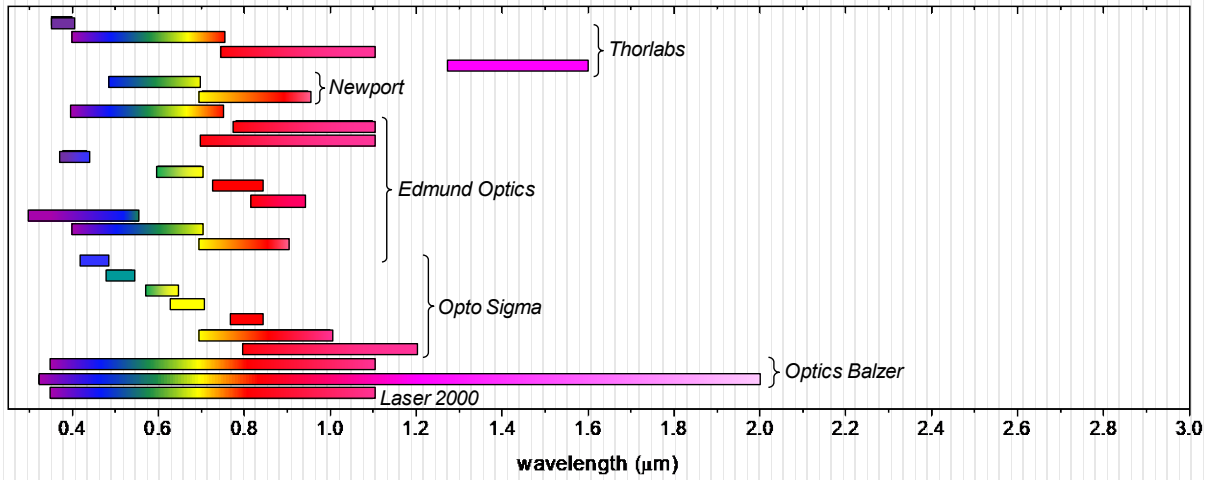


Fig. 2.10. (a) Configuration of a GMR high reflector. Thickness, d = 490 nm; refractive indices n_c = 1.00, n_H = 3.48, n_L = 1.00, n_s = 1.48; grating period Λ = 766 nm; filling factor f = 0.726; incident angle ϑ_{in} = 0º, (b) Calculated spectral response of a GMR device for TM polarized waves [from reference 14].

Beyond thin-film optics:
Resonant-grating-based optical component technology
NSF-SBIR Phase I 2023-2024
Optical component business ~$5-10B/year
This year: Phase I is 275k, Phase II 1M at NSF=National Science Foundation

Table I: Thin-film multilayer reflector band coverage provided by key companies



The electromagnetic band from ~8 to 12 μm covers a region of atmospheric transparency important for long-range terrestrial imaging, spectroscopic applications, night-vision systems, and medical and industrial laser technologies. To utilize this spectral band for applications, effective components including reflectors, filters, and polarizers must be available.

Preliminary results LWIR optical components