## Handheld Spectrometer for Sample Triage

Alexander Scheeline SpectroClick Inc. 60 Hazelwood Dr. Champaign, IL 61820 Military Application: Assay aqueous or airborne chemicals with real time training, low observability, and rapid adaptability. Video/audio/text instructions in user's chosen language. After-action archiving. Result is action recommendation (with underlying numbers available): safe/unsafe/ambiguous using test strips, reflectance, or visible absorbance. Fluorescence under development.

# Warfighter Advantages \_\_\_\_\_ • USB power and communications. • NO3<sup>-</sup> • SpectroBurst<sup>™</sup> stacked,

- Low observability, no separate battery pack.
- Built-in, real-time, method-specific instructions.
   Just Do It (per Nike).
- Result = action recommendation (backed by numbers).
- Each step quality checked with followup instructions to ensure valid results.
- Instructions in any language (sound/text), coordinated with same video.
- Reactant packets and test strips selective per problem.
- QR code labels ensure warfighter, instrument, and problem are coordinated.
- Instrument mass sans case: 0.5 kg.
   Power 0.7 W.
- Windows 7, 8, 10 compatible. Familiar interface.
- Can move to other systems given investment.

- $PO_4^{3-}$
- As(V)
   a
- pH
- Complexible cations
   (Cu<sup>2+</sup>, Zn<sup>2+</sup>, Cr<sup>3+</sup>, Fe<sup>2+</sup>, Fe<sup>3+</sup>,
   Mn<sup>2+</sup>, UO<sub>2</sub><sup>2+</sup>, ...)
- Organic functional groups
- Colorimetrically-sensed biologicals
- Fluorimetry anticipated
- Not suitable for Raman spectroscopy



- mutually-rotated transmission gratings.
- Intelligent use of 2D, low dynamic range cameras
- Dynamic range 5000:1 with an 8 big detector
- Dynamic range set by product of camera dynamic range and grating throughput



- LED light source has built-in wavelength reference.
- Limited wavelength range chosen initially (minimize order overlap problems)
- Biggest barrier to Cell Phone Spectrometry: patent 7,420,663





- Absorbance and reflectance in one package.
- Environmentally rugged
  - Humidity to 95%
  - Easy and inexpensive mponent replacement
  - Automatic recalibration
  - Wavelength referencing frequent
  - Intensity response calibration on demand



# Results File Name Root (no spaces!) DemoSpectrum DemoSpectrum Image: Control of the state of the

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