Optori: A Diagnostic Tool for *H. pylori*

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GOAL

To noninvasively detect *H. pylori* infections in patients within one hour for under $10

BACKGROUND

- ***H. pylori* infects the Upper Gastrointestinal Tract and causes:**
  - Peptic Ulcers
  - Stomach Cancer
  - Dyspepsia
  - Heartburn
  - Abdominal Pain
  - Early Satiety & Bloating
- **70% of Developing World's Population**
- **30-40% of Developed Nation's Population**

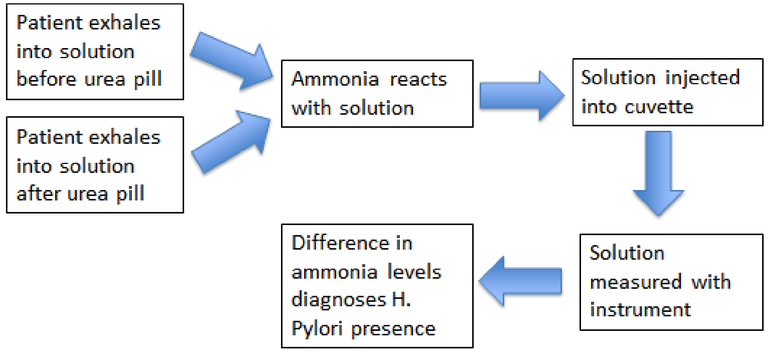
Table 1: Existing H. pylori Detection Methods

Method	Sensitivity	Specificity	Invasiveness	Requires Laboratory	Test Cost
Gastrointestinal Tract Biopsy	>95%	>95%	Highly	Yes	High
Blood Antibody Assay	85%	79%	Minimal	Yes	Low
Fecal Antigen Test	96%	97%	None	Yes	Low
Urea Breath Test	95%	96%	None	Yes	High

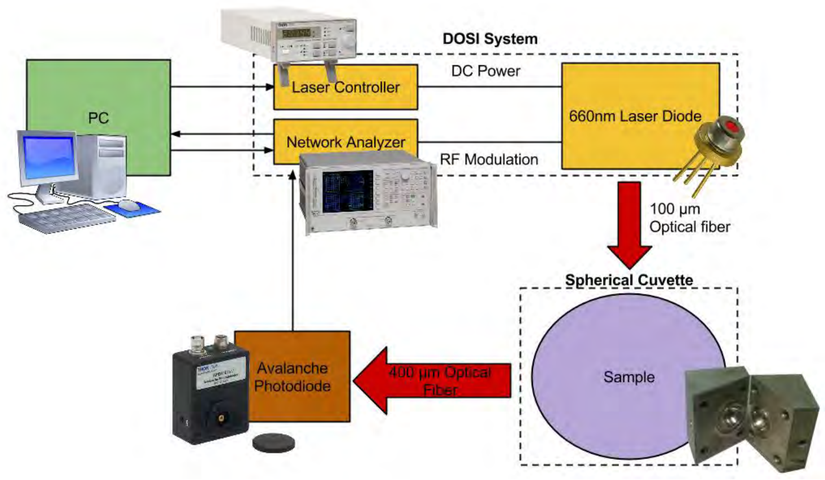
DESIGN INNOVATIONS

- Provides Onsite Testing and Results
- No Laboratory Required
- Use of Simple Optics-based system
- Portable and Low Cost
- Noninvasive

FLOW CHART



SCHEMATIC



DETECTION METHOD

1. Light enters a cuvette filled with patient's exhaled breath (contains ammonia)

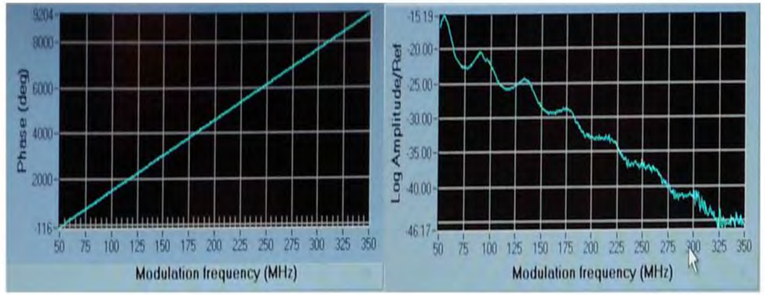
2. The photons experience scattering from the cuvette's medium and absorption from the ammonia

3. The light is recorded from the cuvette and diffusion theory is applied to determine the medium's optical properties

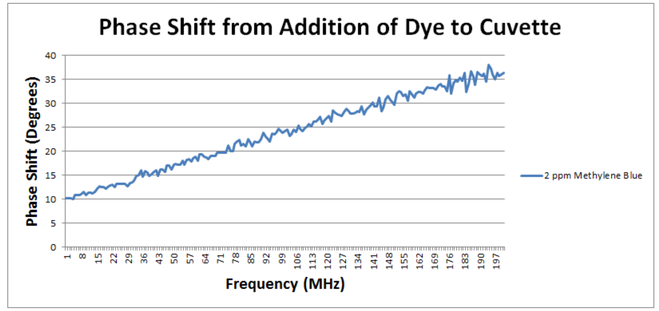
4. The Beer-Lambert Law is applied to calculate the ammonia concentration from the patient's breath

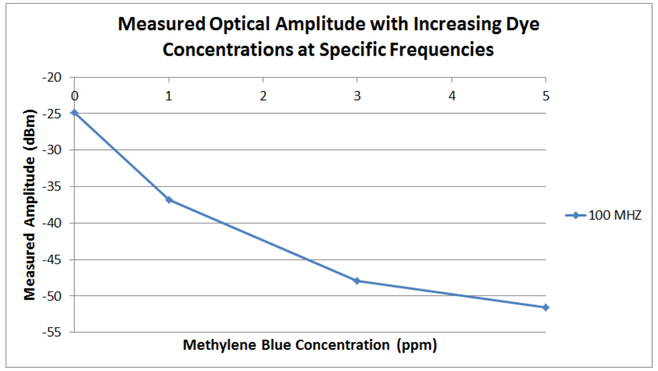
CURRENT RESULTS

Raw Data



Processed Data





FUTURE WORK

- **Select Ammonia Binding-Agent - Winter Quarter**
- **Finalize specific cuvette design and materials - Winter and Early Spring Quarter**
- **Device hardware and software design - Spring Quarter**