



# Victor Zhirnov, SRC Nanomorphic Cell

## Application

- **Application drivers:**
  - Extreme Capsule Endoscopy
- **Size of market:**
  - Potential for widespread use
- **Examples of unmet bio/medical need:**
  - Early detection of cancer
  - Active imaging at the level of cell physiology

## Research Needs

### Scientific/technological problems and barriers:

- Ultra-compact energy sources
- Communication with an external station
- Micro-scale system assembly and packaging

## Advantages

### Impact if successful:

- In-vivo diagnostics and therapeutics at the level of individual cells

### Advantages:

- Non-invasive, real-time, high-resolution, high-selectivity
- Synergistic with current semiconductor trends
  - Scaling
  - Functional diversification

## Metric(s) of Progress

### 3 year goal:

- Sub-mm size energy source

### 6 year goal:

- Subsystems demonstrated (power supply, microcontroller, sensors, communication)

### 12 year goal:

- Prototyped micron-scale system demonstrated

**Resource requirements:** **Annual cost :** ~\$4M/year; **People:** ~10 Faculty ; **Time:** Near term goals ~ 3 yrs., Long term goals ~ 12 yrs.; **Facilities:** Primarily physics, materials science, chemistry and engineering teams with access to relevant operational environments..