
# Top 10 Patents with Commercial Potential!

*Presented to:*
Industry Day 2012

*Presented by:*
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**LEAD PATENT ATTORNEY**



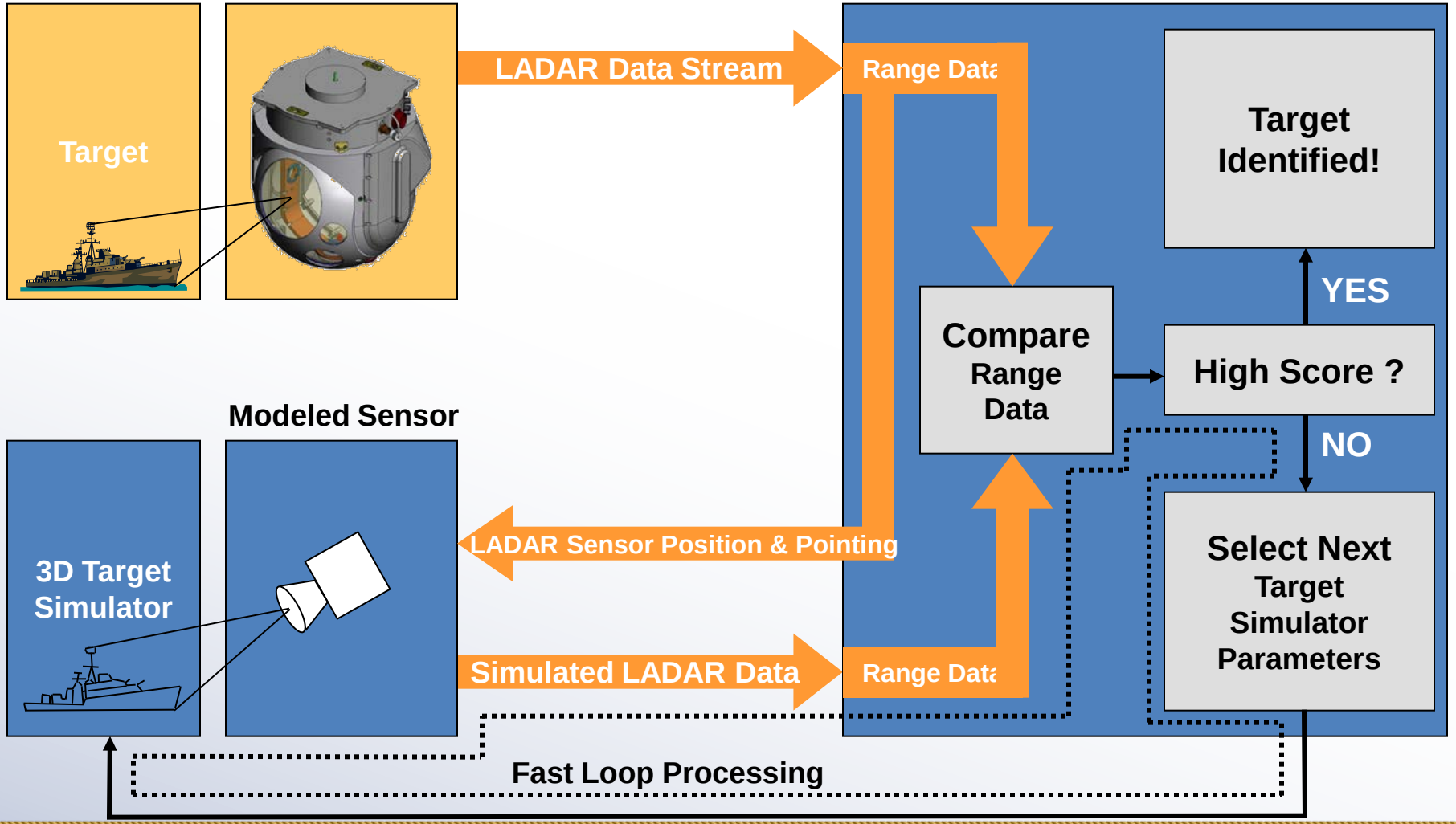
NAVAIR

# Top 10 Patents with Commercial Potential!

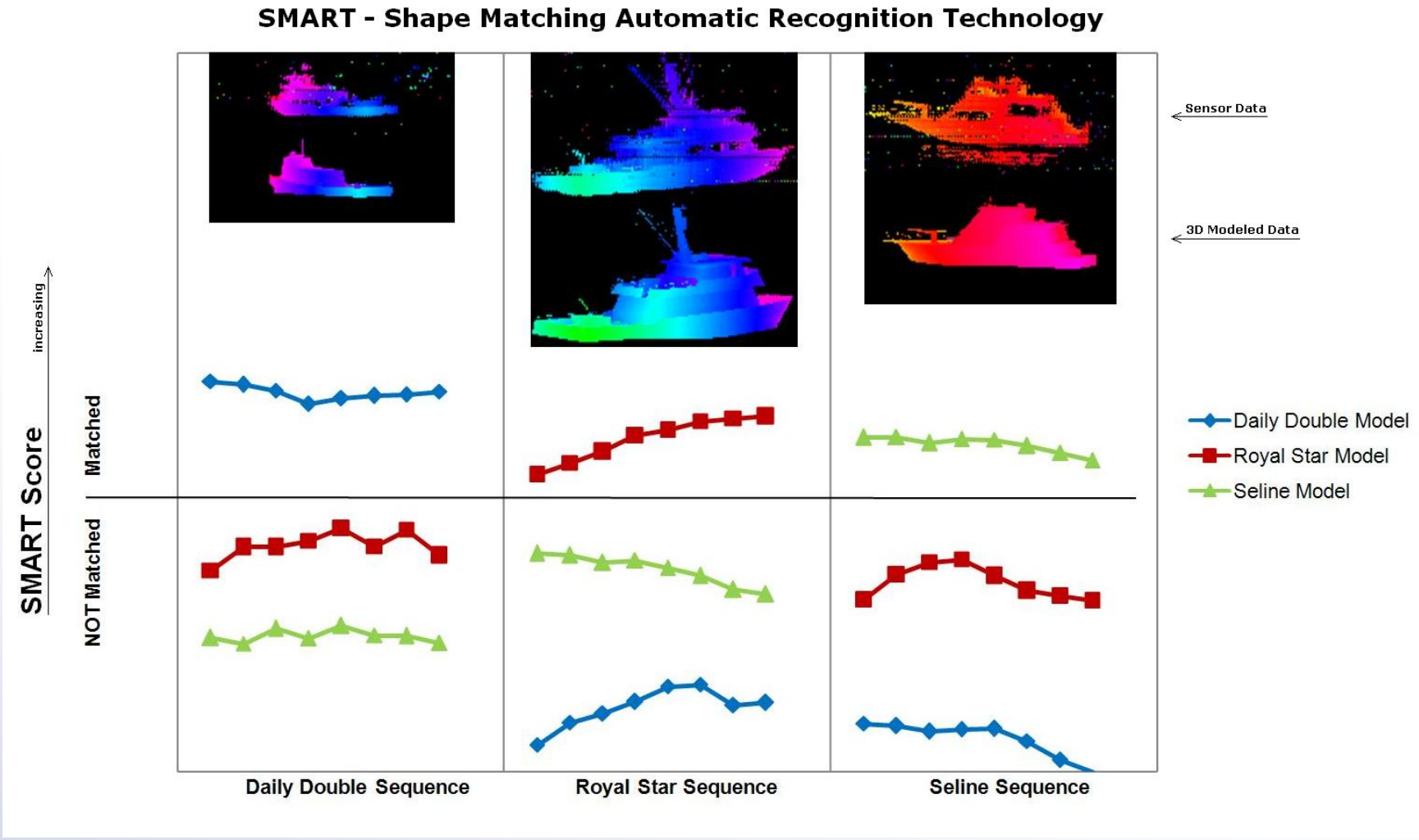
1. LADAR Stream Formatting and Processing Method
2. Three Dimensional Shape Correlator
3. Alcohol to Jet Fuels/Renewable High-Density Tactical Fuels
4. Poly(3,4-alkylene dioxythiophene)-Based Capacitors Using Ionic Liquids as Supporting Electrolytes
5. Face Recognition Process
6. Fumeless Latent Fingerprint Detection
7. Nanoplasmonic Cavities for Photovoltaic Applications
8. Field Colorimetric Test Device
9. Electro-Optic Signal Modulators
10. POSS Polymers

# LADAR Stream Formatting & Processing Method

## SMART – Shape Matching Automatic Recognition Technology



# Three Dimensional Shape Correlator



# Alcohol to Jet Fuels

# Renewable High-Density Tactical Fuels

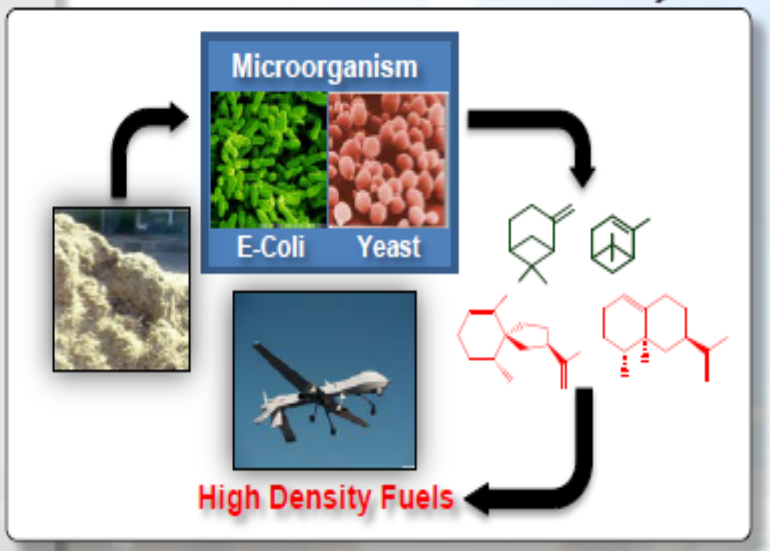
## Inventor: Dr. Benjamin G. Harvey

(Michael E. Wright, Heather A. Meylemans, and Roxanne L. Quintana on several of the patents)

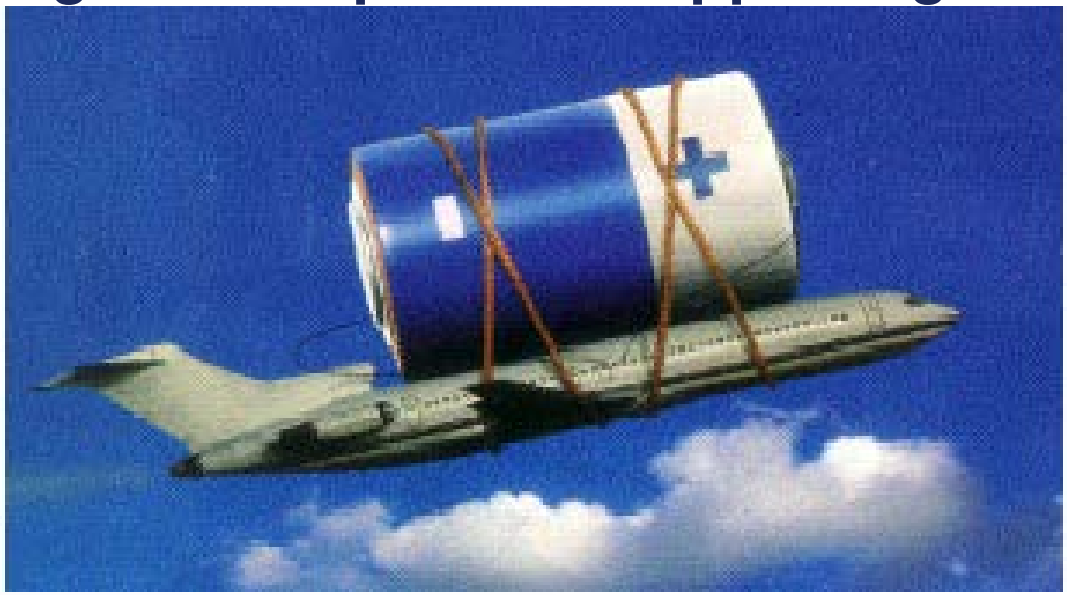
We have developed a variety of renewable high density fuels that have applications for jet, diesel, missile, and UAV propulsion. These fuels can be produced in a sustainable fashion from waste biomass and have been designed to outperform both conventional renewable fuels as well as petroleum derived fuels.

### Commercial / Alternative applications

- ✓ Jet/Diesel Fuel
- ✓ We have a variant that can be used as high octane gasoline—automobiles, av gas, etc.
- ✓ Motor oil
- ✓ Lubricants
- ✓ Resins
- ✓ Paint
- ✓ Coatings/Finishes
- ✓ Scents/Flavorings
- ✓ Cosmetics

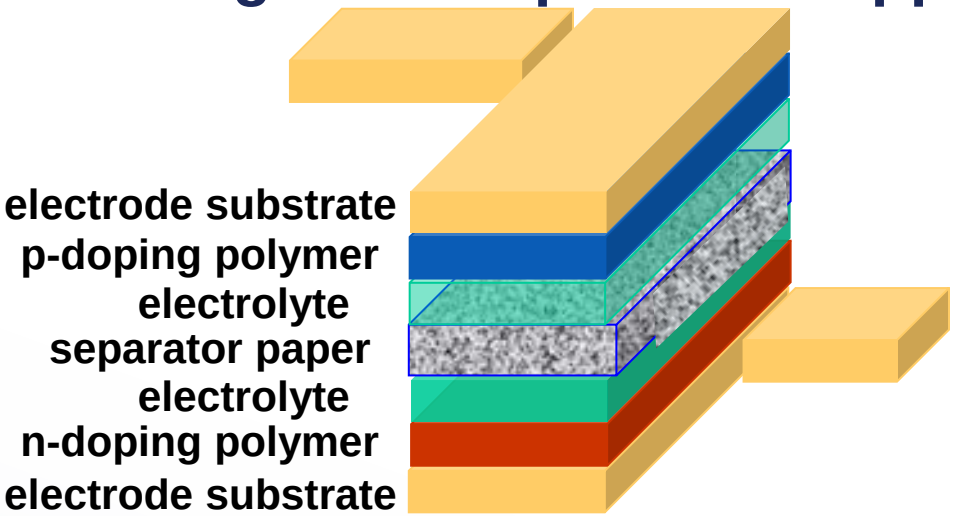


# Poly(3,4-alkylene dioxythiophene)-Based Capacitors Using Ionic Liquids as Supporting Electrolytes



- **High power energy storage**
  - **Higher power density than batteries (kW/kg)**
  - **Lower operating voltage than batteries (1-3V)**
  - **Shorter operating times than batteries (sec-min)**
  - **Higher energy density than traditional capacitors (~3Wh/kg)**
- **Applications**
  - **Military (short intense bursts of power)**
  - **Computer backup (less power, longer time)**
  - **Electric vehicle burst power (intermediate power and length)**

# Poly(3,4-alkylene dioxythiophene)-Based Capacitors Using Ionic Liquids as Supporting Electrolytes




**These cells are smaller than a credit card**

## Power Density

- Currently 625 Watts/kg
- Cathode improvements could double this

## Charge Time

- Under a minute; more studies needed.

## Stability/Hold Life

- In inert atmosphere, devices are quite stable; good hermetically sealed packaging will be crucial.

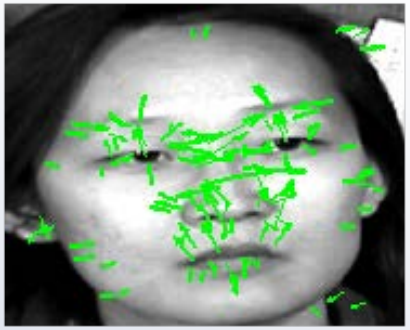
# Face Recognition Process

Feature Descriptor (SIFT) detects and extracts local feature descriptors that are reasonable invariant to:

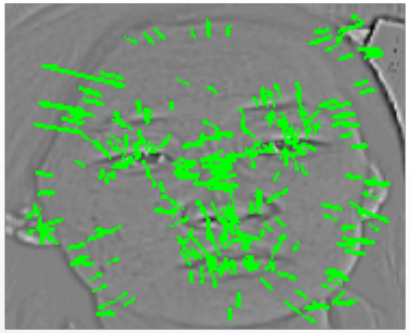
- Changes in scale, 2D translation and rotation illumination, image noise and viewpoint.

SIFT keypoint detector is not invariant to illumination changes.

Highpass filtering + adaptive thresholding ensures adequate number of descriptors per image.



**Keypoint selection with original SIFT method, 120 points**



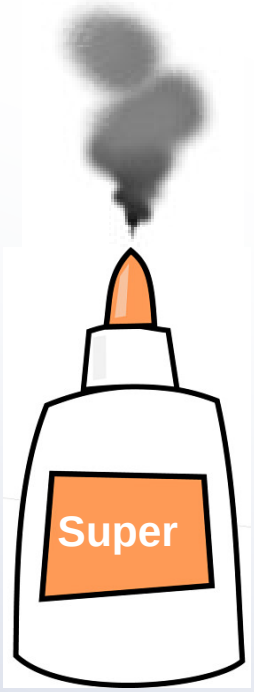
30° pose change

# Face Recognition Process

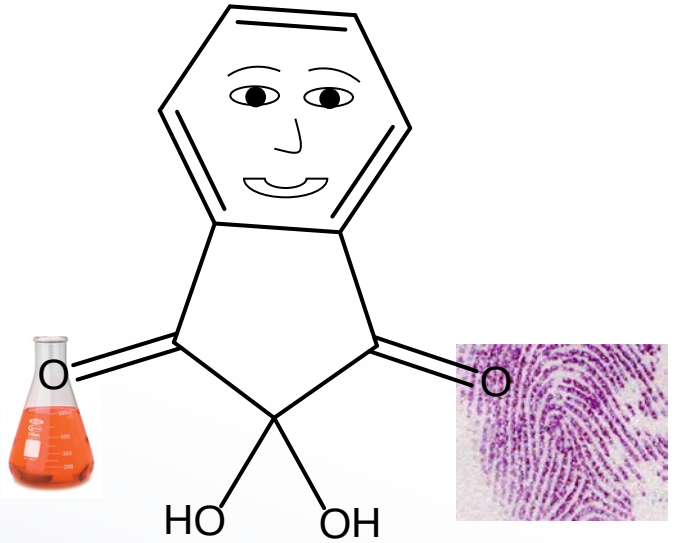
# Fumeless Latent Fingerprint Detection

## Current Methods of Latent Fingerprint Development

### Fuming Super Glue



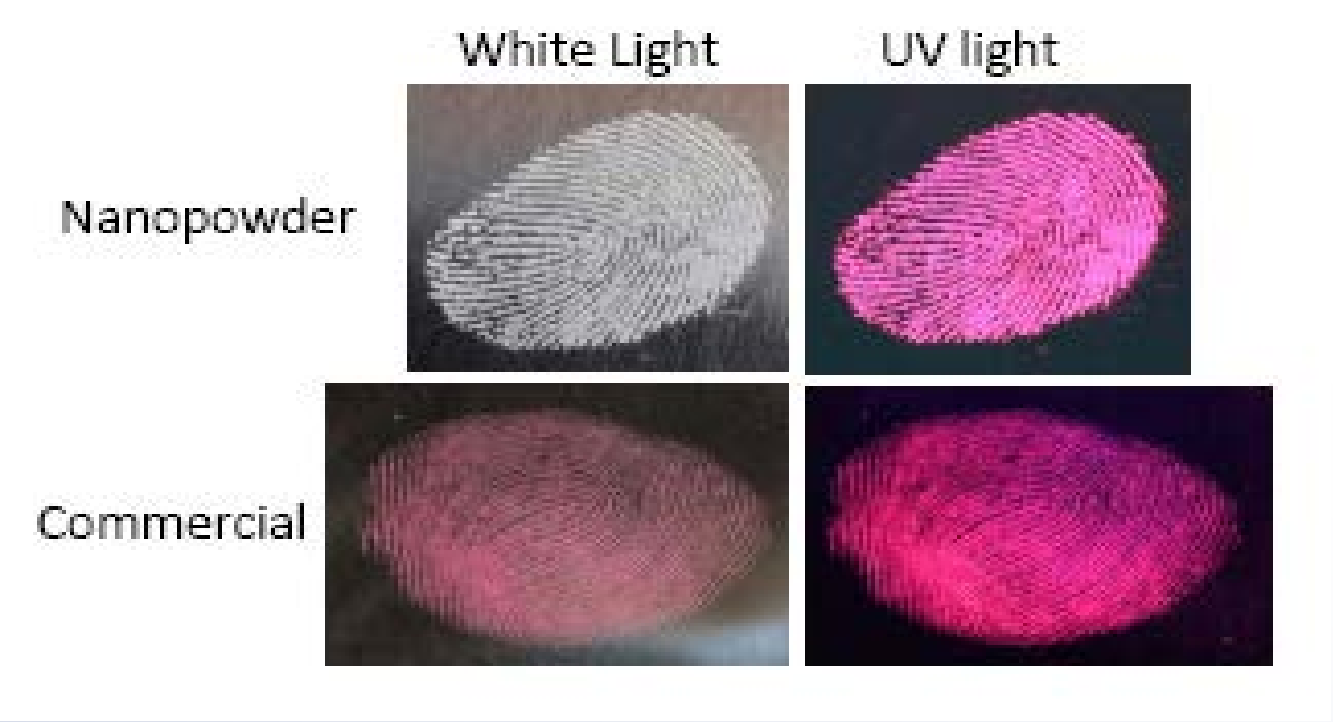

### Ninhydrin



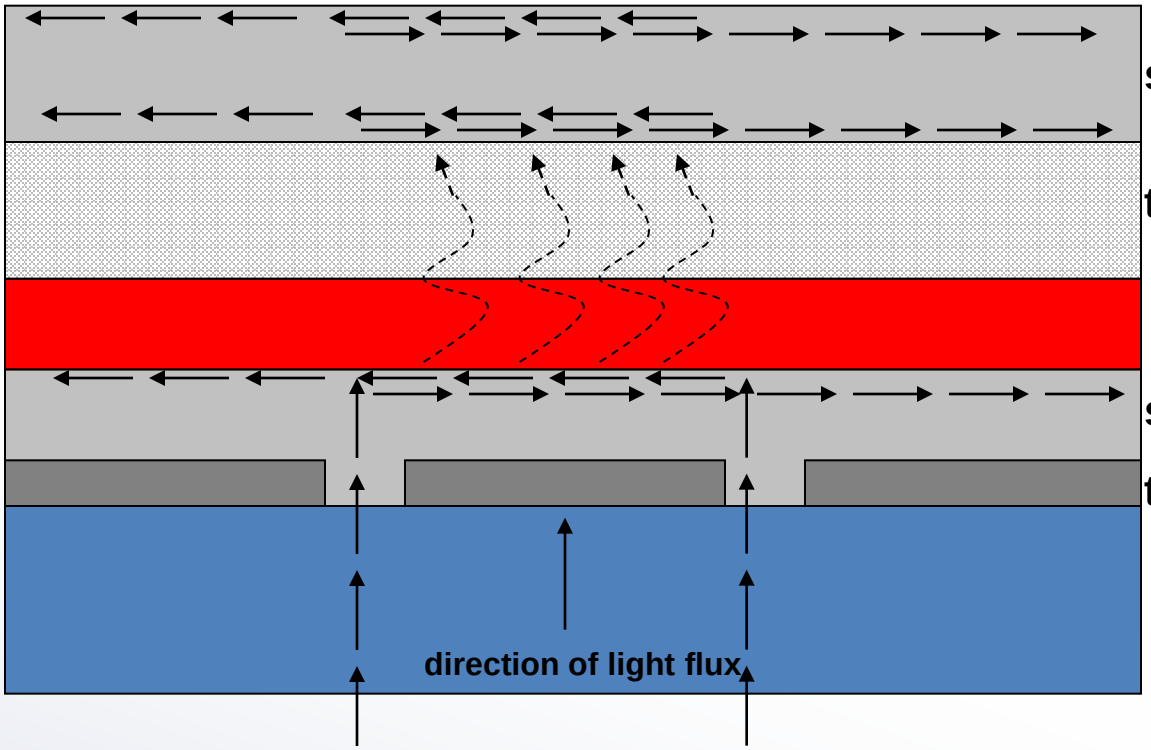
# Fumeless Latent Fingerprint Detection

## Commercial / Alternative applications

Detection of latent finger, nose, and paw prints for crime scene evidence collection and military applications.



# Nanoplasmonic Cavities for Photovoltaic Applications

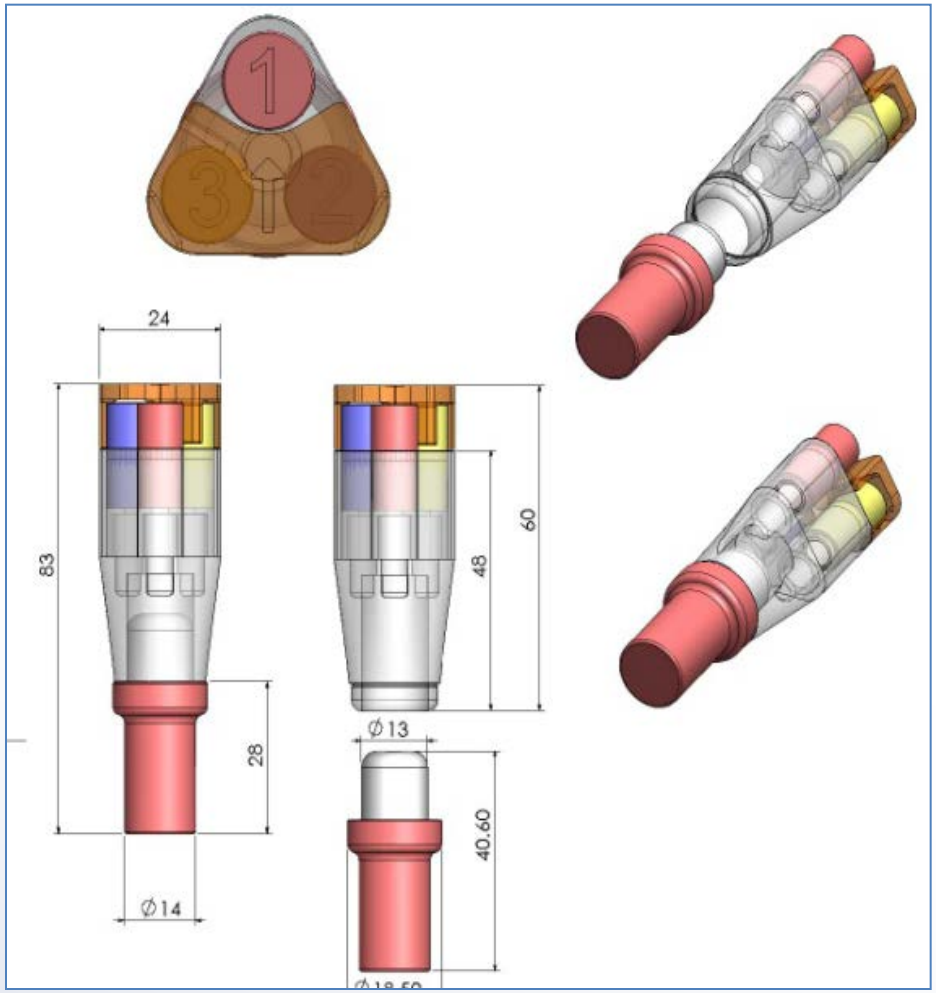



**Advantages to this design**

1) plasmonic enhancement of light absorbance
2) slits set up plasmonic interference pattern
3) polythiophene chains lie in plane and absorb light more efficiently travelling parallel, (McGehee, et al. Advanced Functional Materials, Volume 15, Issue 12 , Pages 1927 - 1932 : 31 Oct 2005). This design causes a fraction of the incident light to travel parallel to the chains.

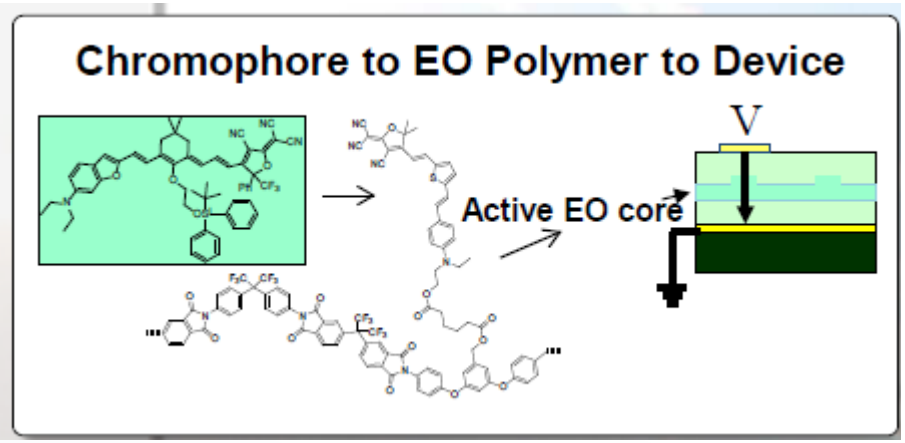
# Field Colorimetric Test Device

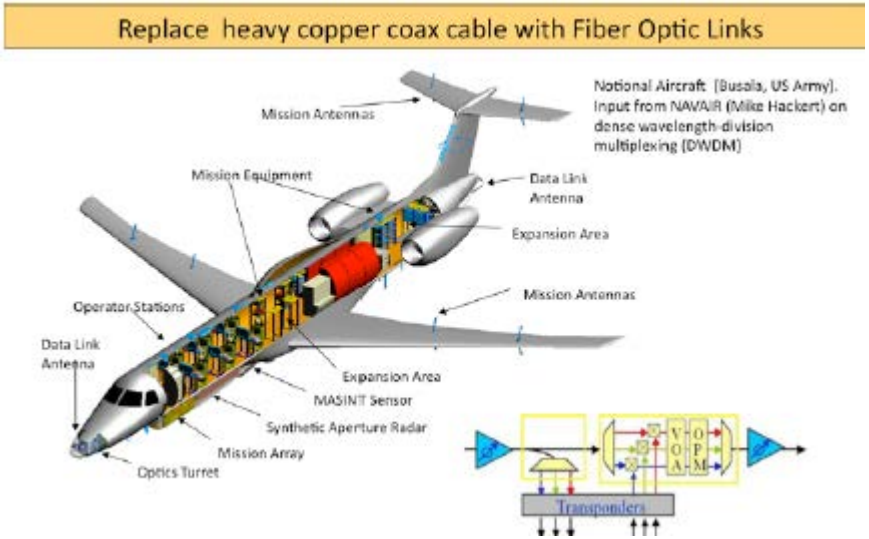
**Small, refillable, disposable, adaptable kit (like a first-aide kit) with tests that presumptively detect explosives and drugs**

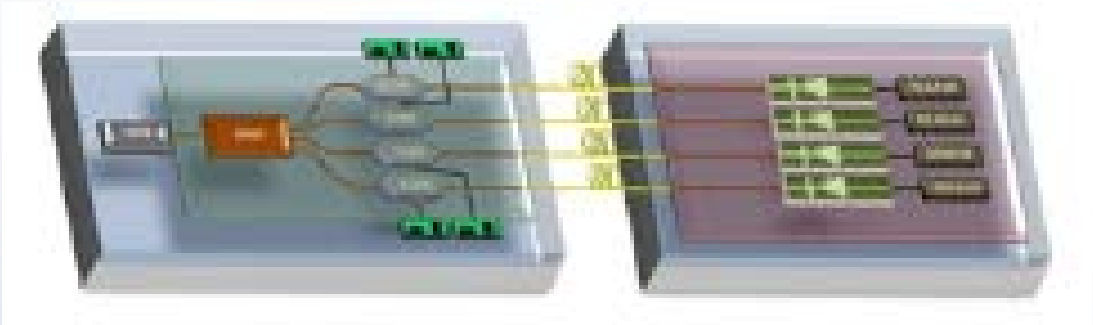



***Conceptual Form:***
***Simple***
***Intuitive***
***Small***
***Obvious results***
***No sampling gloves***
***Contained reagents***
***Analyze now or later***
***Foolproof operation***

# Electro-Optic Signal Modulators



NEW MATERIALS FOR ELECTRO-OPTIC SIGNAL MODULATION
- Optical Switching at Sub-Nanosecond Speed
- Bandwidth Greater Than 100 GHz

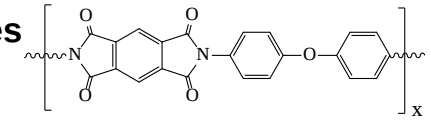
# Polyhedral Oligomeric SilSesquioxane (POSS) POLYMER

## Commercial / Alternative applications

- ✓ Light weight composite structures for LEO
- ✓ Coatings to protect Photovoltaics/Electronics
- ✓ Flexible and Tough Kapton equivalent films
- ✓ Modifying/Decreasing flammability of polymers
- ✓ Adjusting hydrophobicity of the polymer surfaces
- ✓ Preparing Nano-structured polymer toughners
- ✓ Burn modifiers for Polymeric Materials
- ✓ Hybrid Polymeric Materials

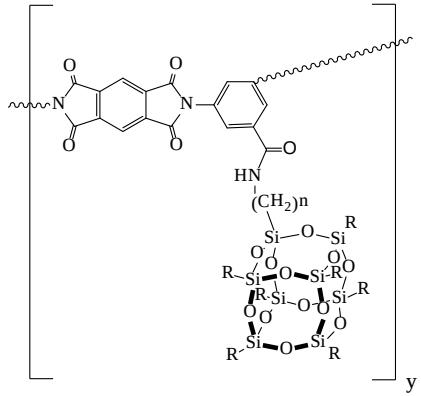
polyamic acid solution

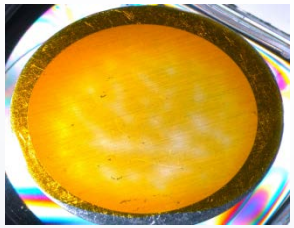
heat, $-H_2O$

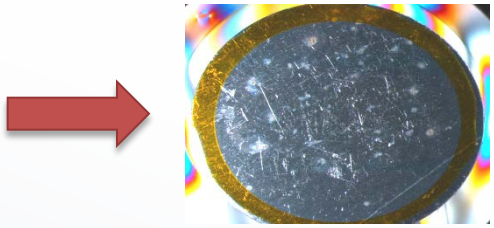


High Molecular SSQ-Polyimide

$x + y = 1.00$

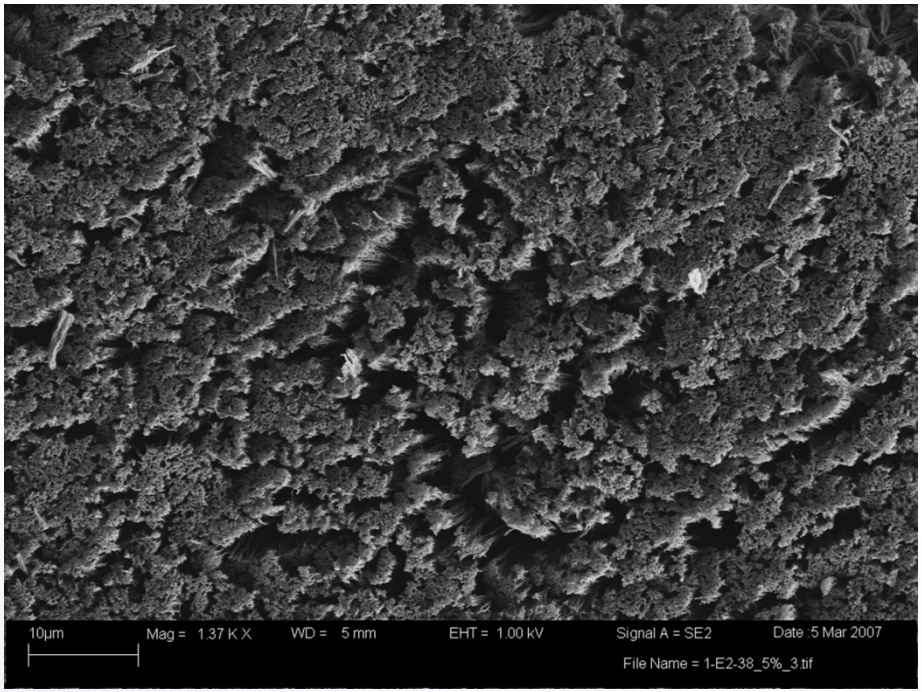


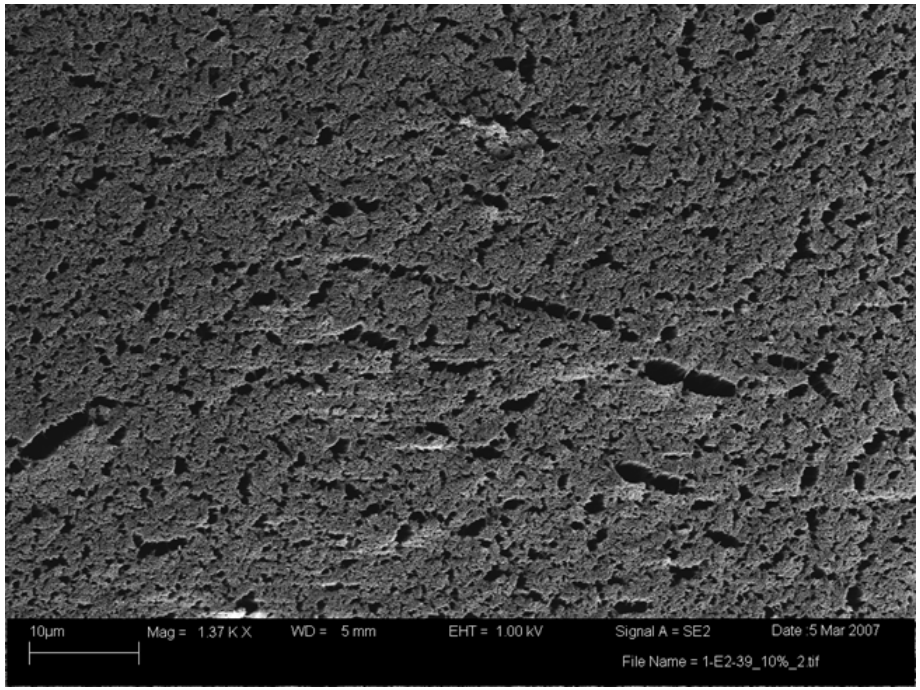




**Atomic Oxygen erodes away polymer in days without POSS protection**

# Polyhedral Oligomeric SilSesquioxane (POSS) POLYMER




**Scanning electron microscope images of two MC POSS polyimides that were exposed to the LEO environment for 3.9 years on MISSE-1. The magnification in both images is 1,370.**

FEEL FREE TO INTERACT WITH THE INVENTORS AND SEE ALL THE GREAT DEMONSTRATIONS!