

# FIE $\infty$ CE

National Centre for Flexible Electronics



## Call for Expression of Interest For Flexible Gas Sensors

23<sup>rd</sup> August 2015



Indoor air quality



Early disease detection

## Technology Development for Flexible Gas Sensors



Food packaging: Spoilage

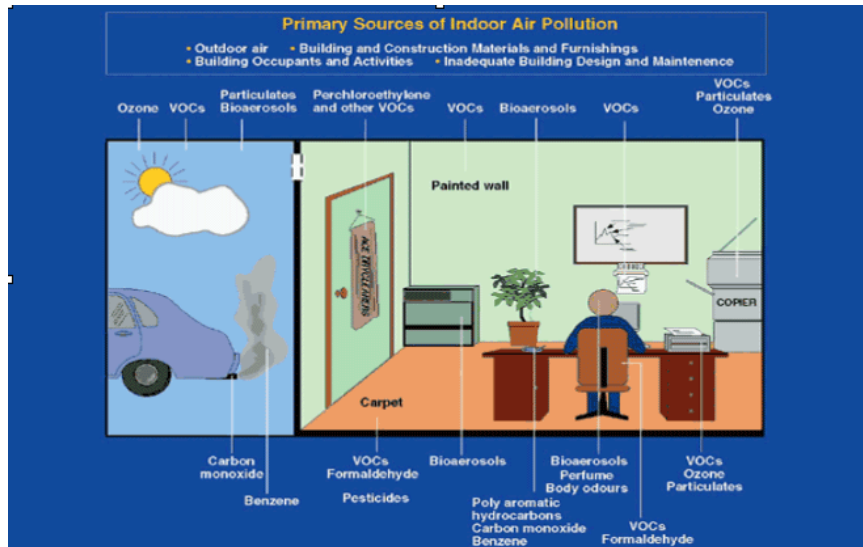


Safety/Environmental applications

# Background

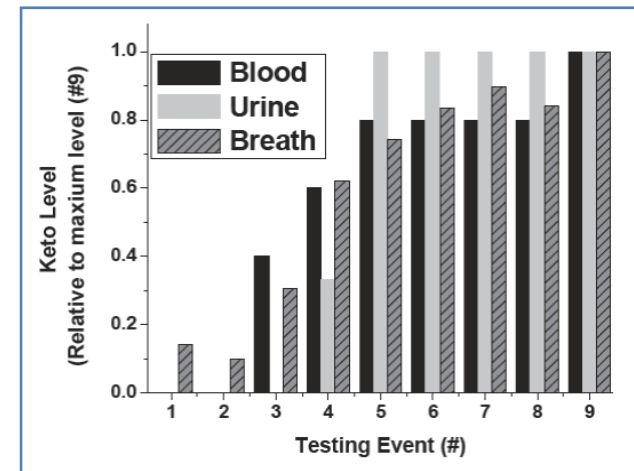
Google images

## 1. Indoor air quality



Various gases that affect human health need to be detected

## 2. Early disease detection



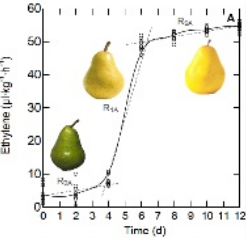

<http://www.peertechz.com/Obesity-Diabetes-Metabolic-Syndrome/GJODMS-1-103.php>

Gases in breath can be indicators of disease

# Background (contd)

## 3. Food Packaging: Spoilage

### Importance of Gases in Food/Ag



Ethylene:

- **Given off by produce during ripening** (15+ climacteric fruits, e.g. avocado, banana, apple, mango)
- **Induces ripening** (35+ fruits, vegetables, and flowers respond to ethylene)
- **Indicator of plant health** (can be combined with measurement of other gases)

Amines:

- **Indicator of meat/fish spoilage**

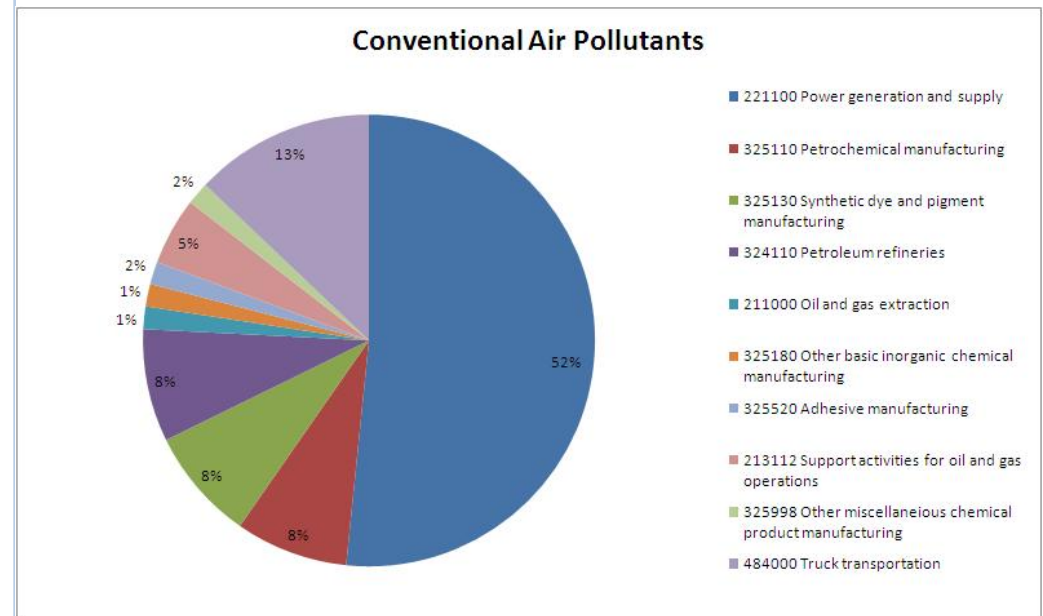
Ammonia:

- **Soil nutrient level monitoring**

Google images

Indication of food spoilage by detection of characteristic emitted gases

## 4. Safety/Environmental Applications

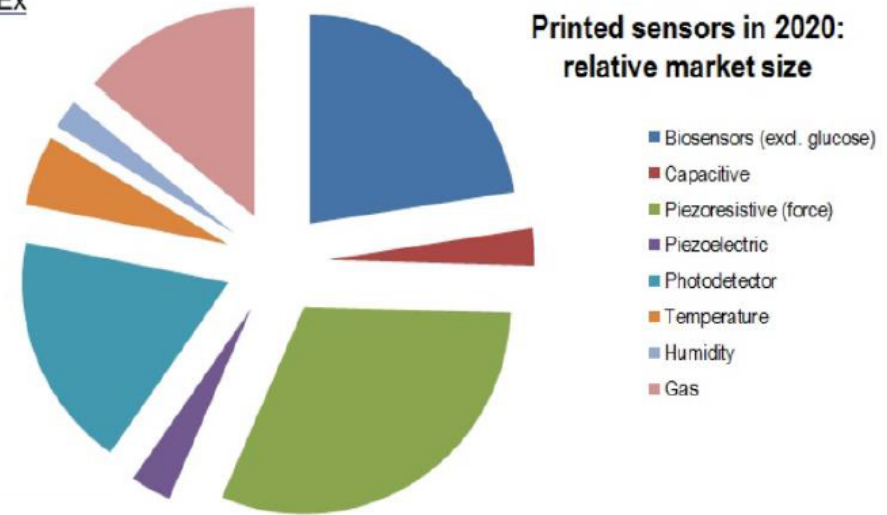


Hazardous and Pollutant Gases need to be detected

# Market Size and Potential

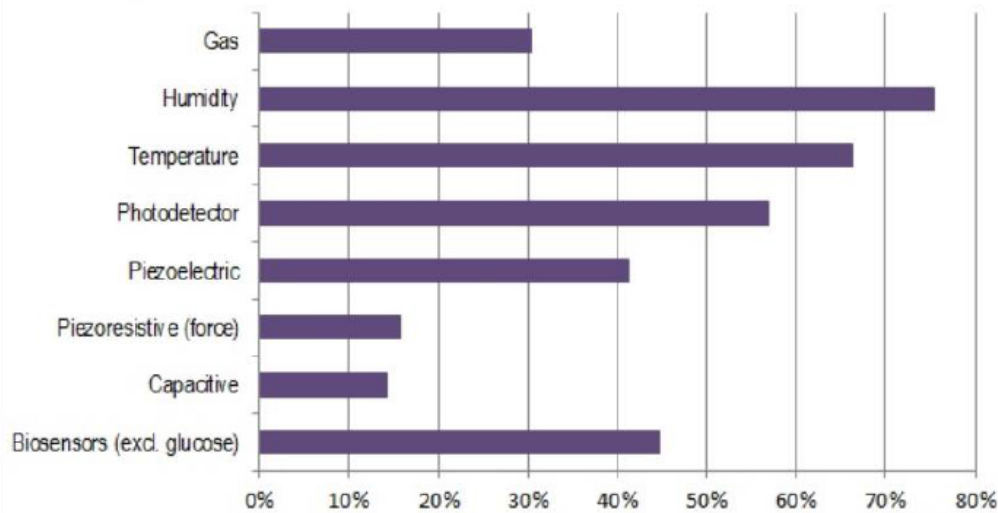
IDTechEx

Printed sensors in 2020:  
relative market size



IDTechEx

Printed sensors CAGR 2015-2025



# Current Available Options

- Metal oxide based sensor
- Operating temperature:  $>300\text{ }^{\circ}\text{C}$
- Cost:  $> \text{INR } 6000/-$

Indoor air quality  
management system

- Several platforms
- Alcohol detection
- Cost:  $> \text{INR } 10000/-$

Early disease detection

Some of the representative  
but not exhaustive options

- Not yet commercialized
- Development of wireless ethanol sensing tag for food packaging

Food packaging:  
Degradation status of food

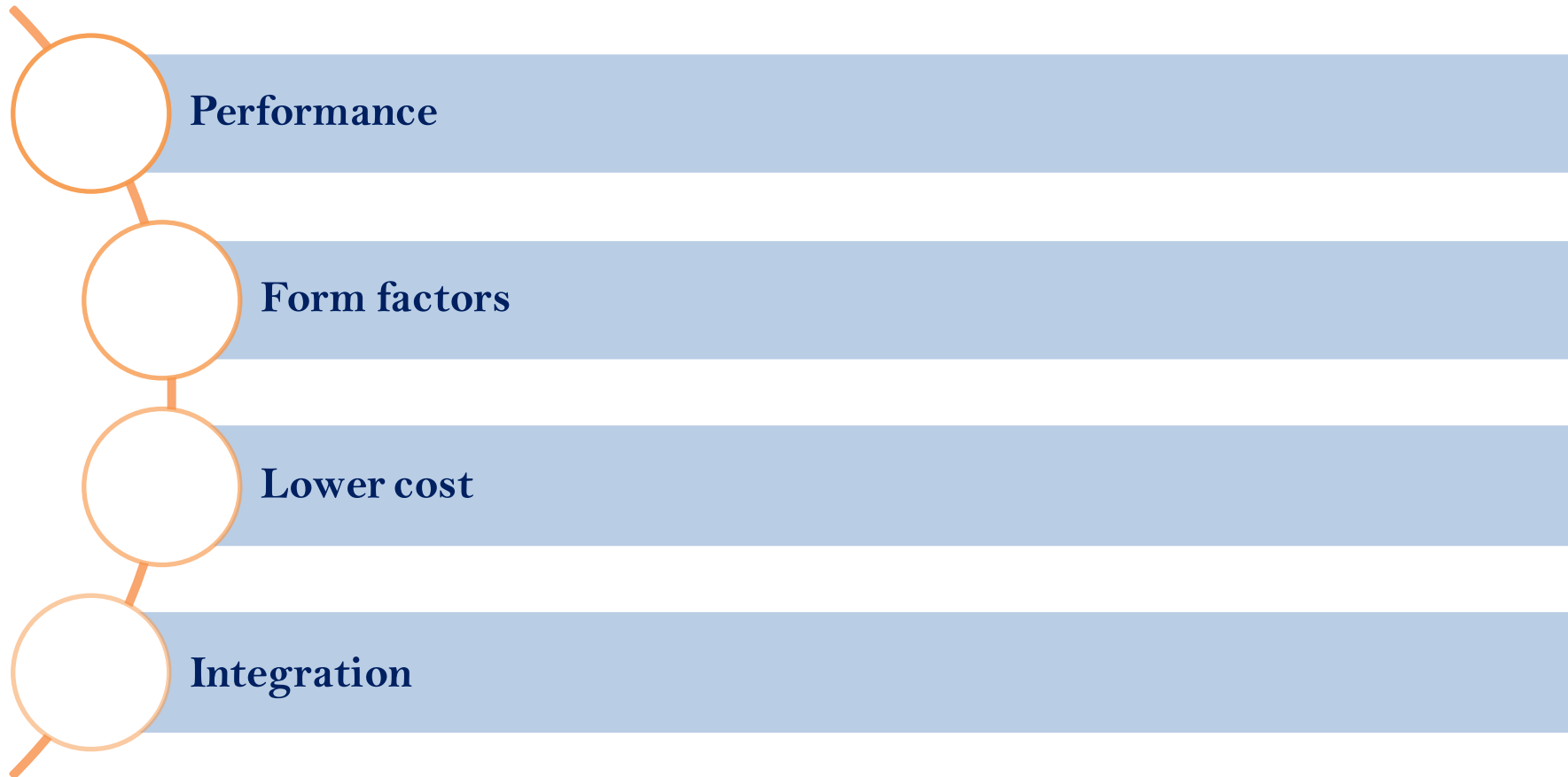
- Metal oxide based sensor
- Operating temperature:  $>300\text{ }^{\circ}\text{C}$
- Cost:  $> \text{INR } 6000/-$

Safety application:  
Industrial pollution

# Proposed Approach

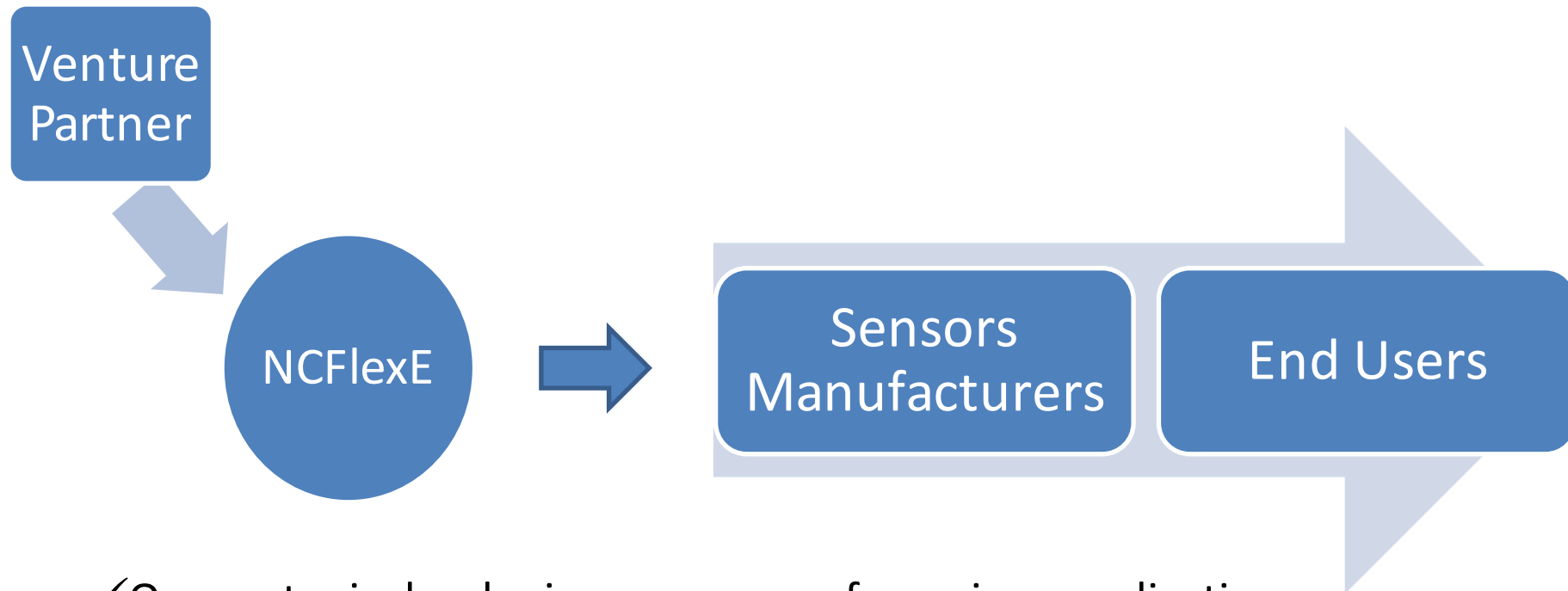
- 1** Functional sensing materials
- 2** Tunable selectivity and high sensitivity
- 3** Sensor array – multianalyte detection
- 4** Flexible platform
- 5** Communications protocols – application specific

# Advantages of proposed solution





# Call for Partners



- ✓ Our centre is developing gas sensors for various applications
- ✓ We are seeking partners across the value chain shown above
- ✓ We are looking for partners to enable the scaling and manufacturability of the developed processes
- ✓ Preferential terms for early partners

# Contact Information

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Also visit our webpage for more details on partnership models and other technology domains: [www.ncflexe.in](http://www.ncflexe.in)