Gas Sensors and Biosensors
Gas Sensor

- • Solid State
- • PTFE based Gas Sensors.
Solid State Gas Sensors

• Metal Electrode Pastes
• Solid Electrolyte Pastes
PTFE Based Gas Sensors

- Cottage industry techniques
- Operator dependent
- Highly skilled
Application Methods

- Puddling
- Stamping
- Screen Printing
- Stencil Printing
PuddlingManufacturing
Method

• Blend powder with PTFE stabilised solution.
• Dispense into shallow containers made from aluminium foil.
• Dry.
• Cure.
• Press on to PTFE substrate.
PuddlingFormulations
Disadvantages

- Made as they are used by the operator.
- Liquid, syringe dispensed.
- Shelf life of a few minutes.
- Settle readily.
Puddling Formulation

Advantages

• Low waste
• Easy processing
Disadvantages of Puddled Electrodes

- Operator dependent.
- Highly skilled
- Variable Quality of Electrodes
- Short Shelf
Stamping formulations

- Highly viscous
- Two roll milled
- Electrodes stamped out
- Pressed on to PTFE
Stamping Formulations

- Advantages
  - Low waste
  - Small batches

- Disadvantages
  - Inconsistent mixing
  - Variability in electrodes
  - Operator dependent
  - High level of training
New Paste Design

- Use of PTFE powders.
- Use of binder resin.
- Good Dispersion
Other Paste Properties

• Good shelf life.
• Good screen printing properties.
• Good screen life
• Good drying properties
• Good curing properties.
Gas Sensor Electrodes

- Platinum Black.
- Iridium Black.
- Gold.
- Other Metals combinations.
Carbon Electrode Sensors.

- Blood Glucose
- Agri/Food Sensors
- Environmental
Blood Glucose Electrodes

- Carbon Working Electrode Paste
- Reference Silver/Silver Chloride Paste
- Insulation Paste
Carbon Paste

- Carbon
- Graphite
- Resins
- Solvents
- Surfactants
Functional Carbon Pastes

• Mediated
• Platinised
Mediated Carbons

- Meldola’s Blue
- Cobalt Phthalocyanine
Platinised Carbon

- Carbon with platinum deposited on the surface
- High surface area carbon
Low Temperature Working Electrodes

- Polymeric Gold
- Polymeric Platinum
High Temperature Working Electrode Paste

- Gold Metallo-organic
- Platinum
Further Functionality

- Future GEM developments
- Combined work with AET
Reference Pastes

- Silver/Silver Chloride
- Varying Ratios
- 90:10 to 40:60, Silver: Silver Chloride
Conductor Pastes

- Carbon Conductor pastes
- Silver Conductor pastes
Insulation Pastes

• Different resin types
• Different functionality
• Different Colours
Mediator Pastes

• Custom made mediator pastes.
Capillary Layers

- Used to help draw solutions to the electrode surface
Spraying Formulations

- Wetting agents
Selective Membranes

- PES
- PVC
- Cellulose Acetate
Future Developments

- Bio Dot formulations
- Bio Robot Formulations
- Added functionality to carbon pastes
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