# Wearable polyimide–PDMS electrodes for intrabody communication

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# PDMS Electrodes

- silicone elastomer, poly(dimethylsiloxane) [PDMS] also known as Sylgard® (Dow Corning Corp.)
  - Excellent dielectrical properties
  - Flexible
  - Biocompatible
  - Good water and gas permiability

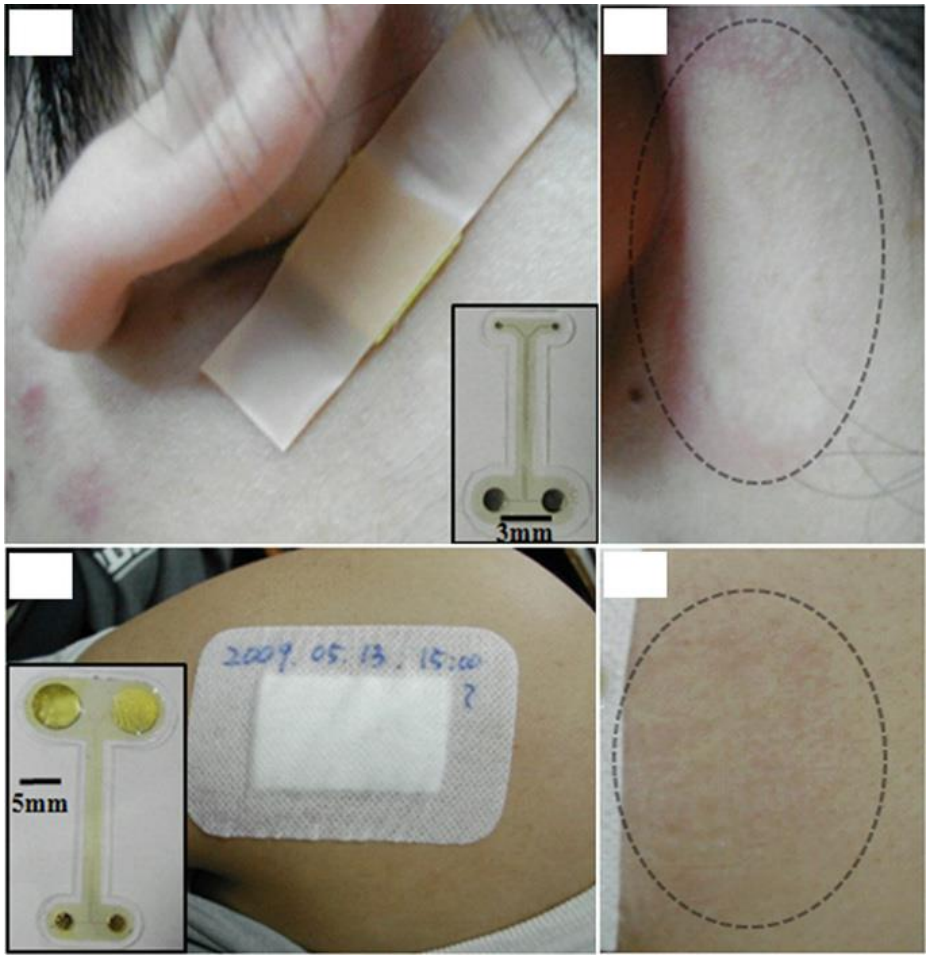
# Electrode design

- Electrodes
  - Use for communication as I-BAN electrode
  - Wearable on body for more than a week
  - Does not damage skin
- Made of flexible polyimide (PI) encapsulated with polydimethylsiloxane(PDMS)

# Testing

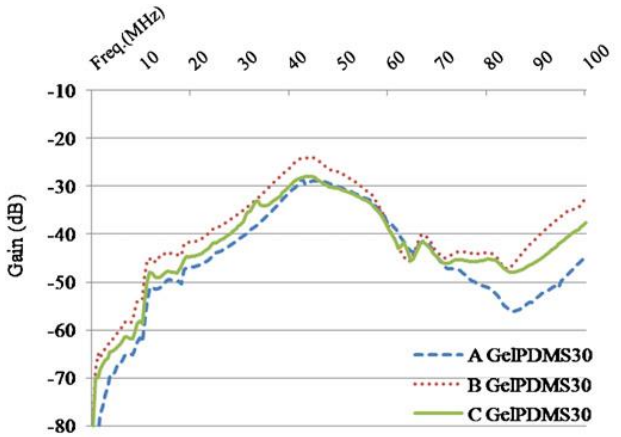
- Toxicity test on human mesenchymal stem cells shows that electrodes were non-toxic
- Sinusoidal signals of 45 MHz were successfully transmitted through the skin with high fidelity between dry electrodes separated by 30 cm. This is less affected by separation than AgCl electrodes.
- Durability electrodes were bent 700 000 times at an angle of 90

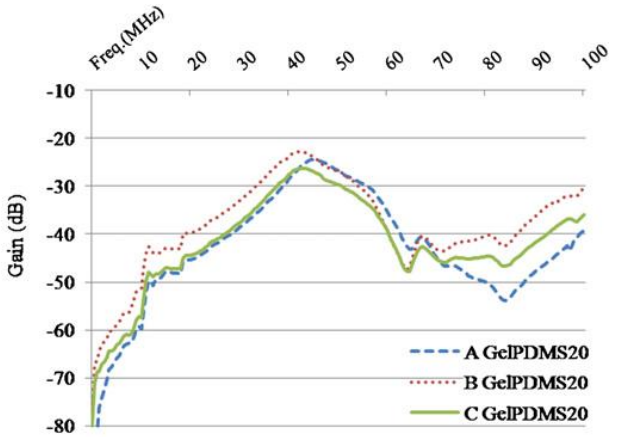
# Wearing the electrode for one week



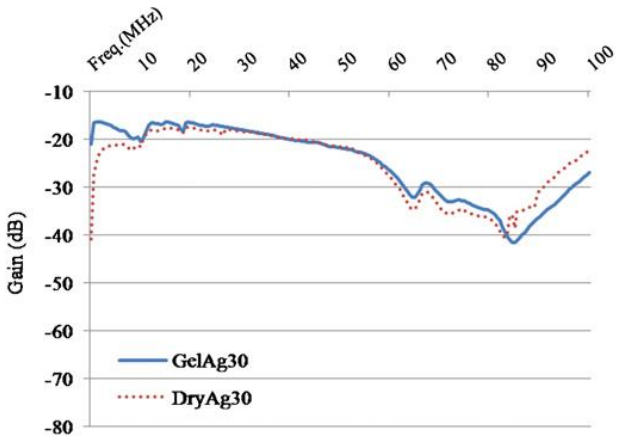
# Testing comparisons in gain

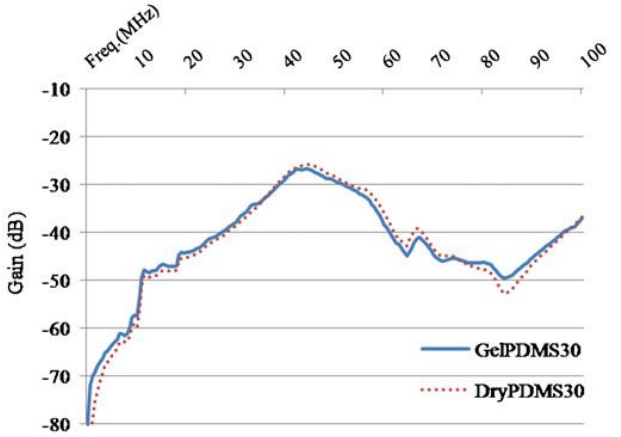
Distance 20/30 cm




Gel/Dry comparison




$$\text{Gain (dB)} = 20\log\left(\frac{RX\text{ signal's amplitude}}{TX\text{ signal's amplitude}}\right)$$

# Impedance of electrodes