

A washable silver-printed textile electrode for ECG monitoring

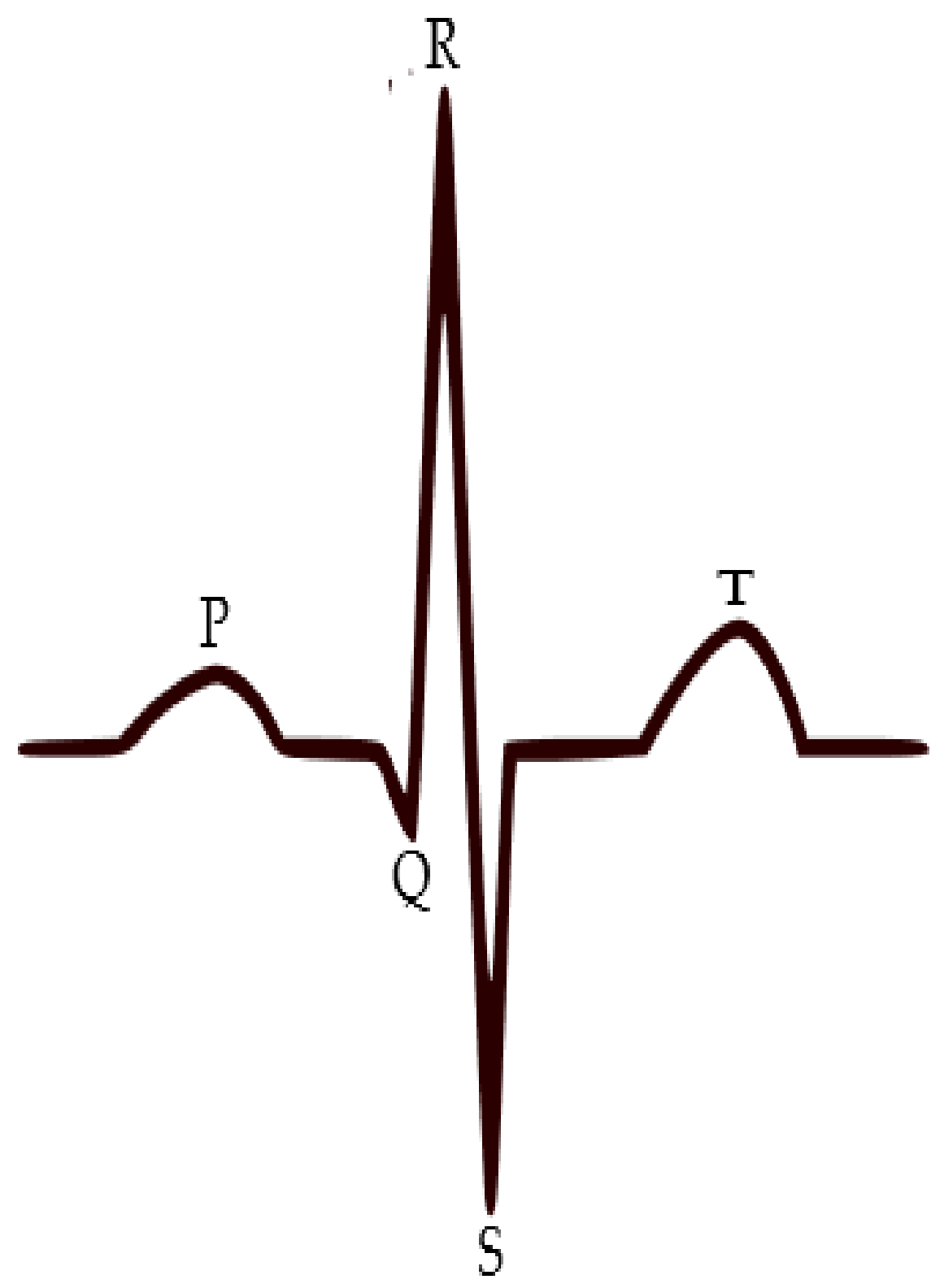
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BACKGROUND



Electrocardiography (ECG) is an important bio-signal to know heart condition of an individual.

Currently available wearable ECG sensors commonly use Ag/AgCl gelled electrodes.

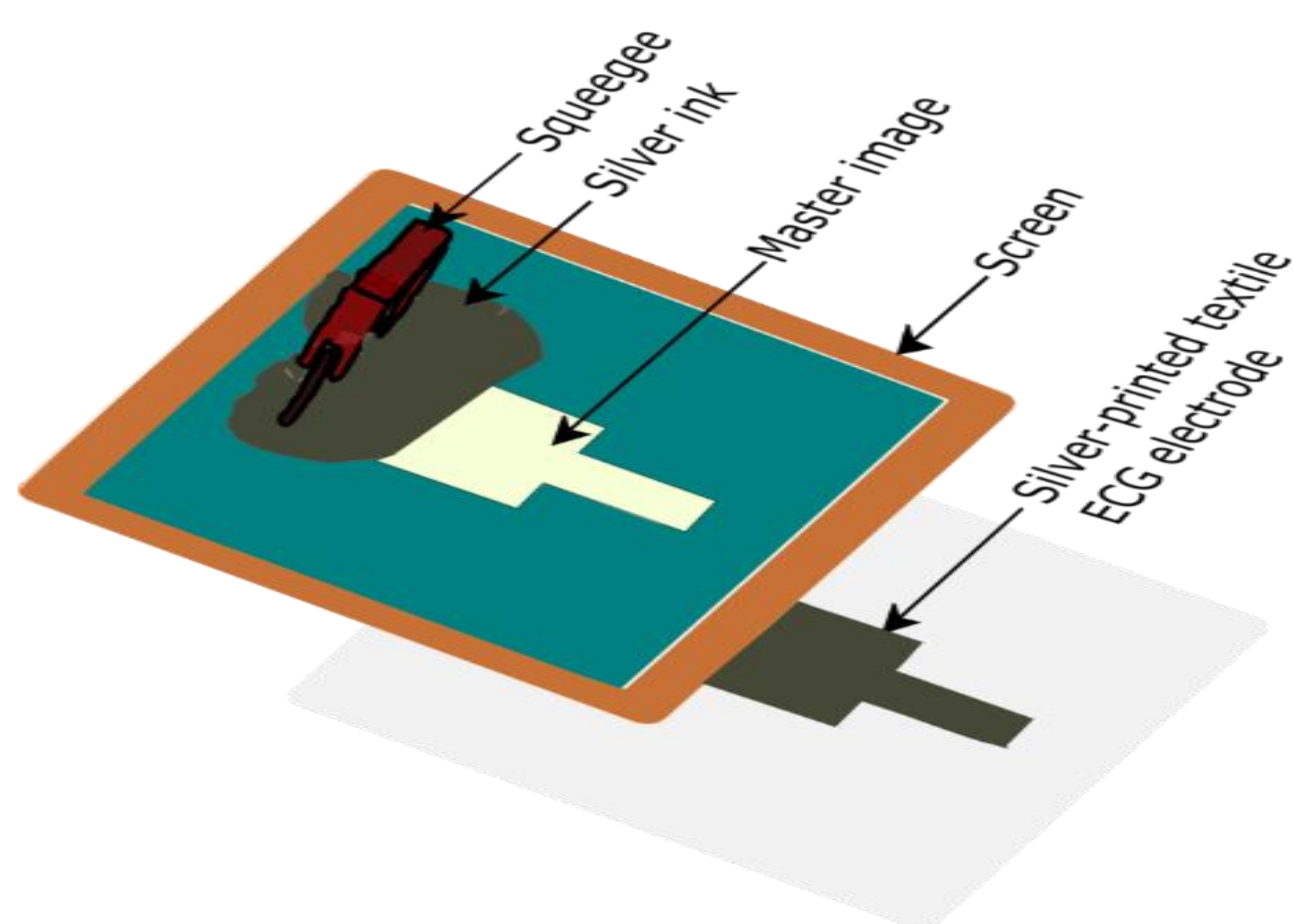


- The wet gel dehydrates during usage and cause skin irritation and low signal quality.

- The demand of wearable ECG sensors is increasing. Textile based sensors could contribute a lot in this area.

- This work focus on development of textile electrodes and its ECG detection performance.

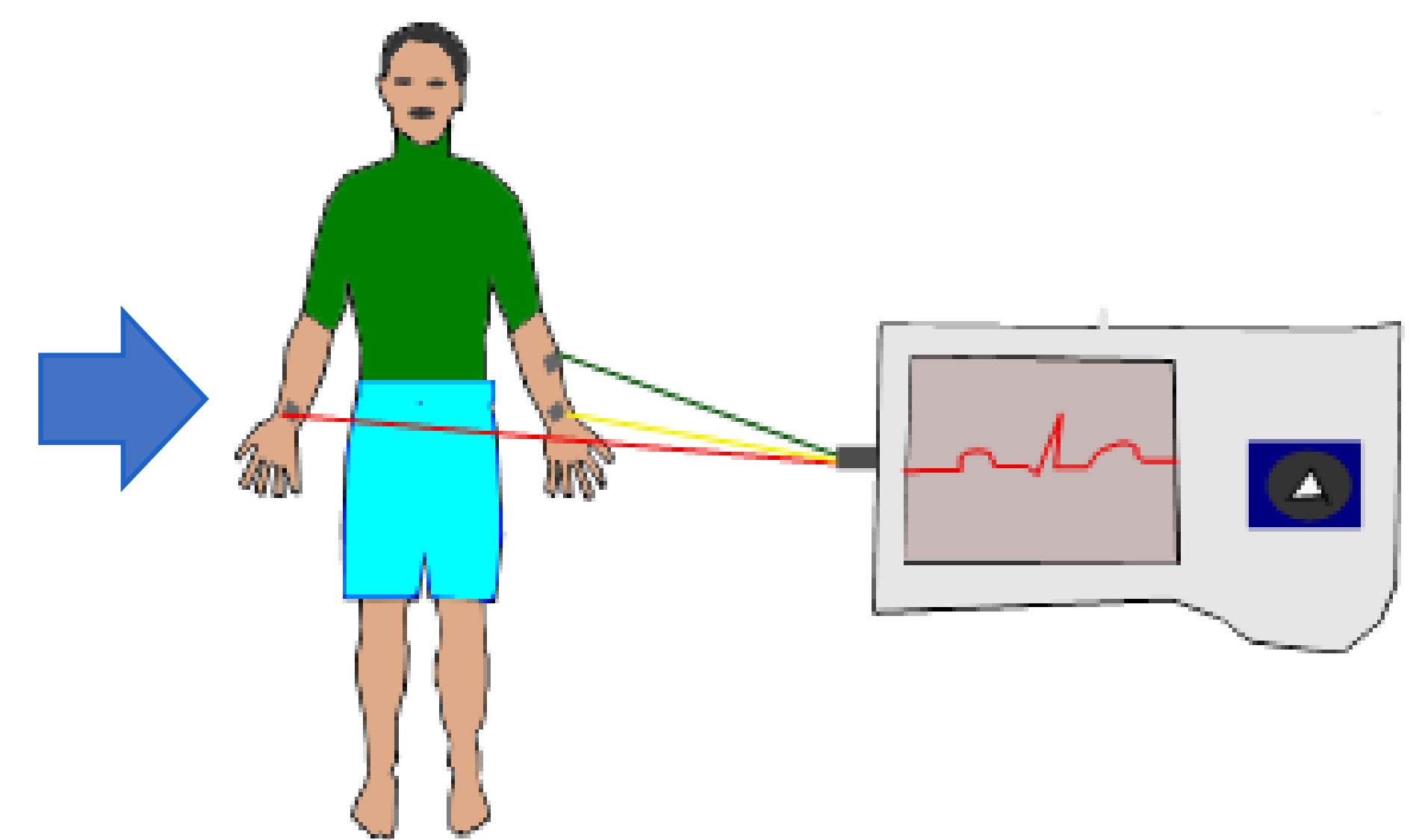
METHODOLOGY



- Screen printing process cured at 120 °C for 30 min track.



- Front view of developed electrode with 34 X 22 mm² active area
- Snap button connect to the electrodes.



- Electrode placement for ECG measurement

RESULTS AND DISCUSSION

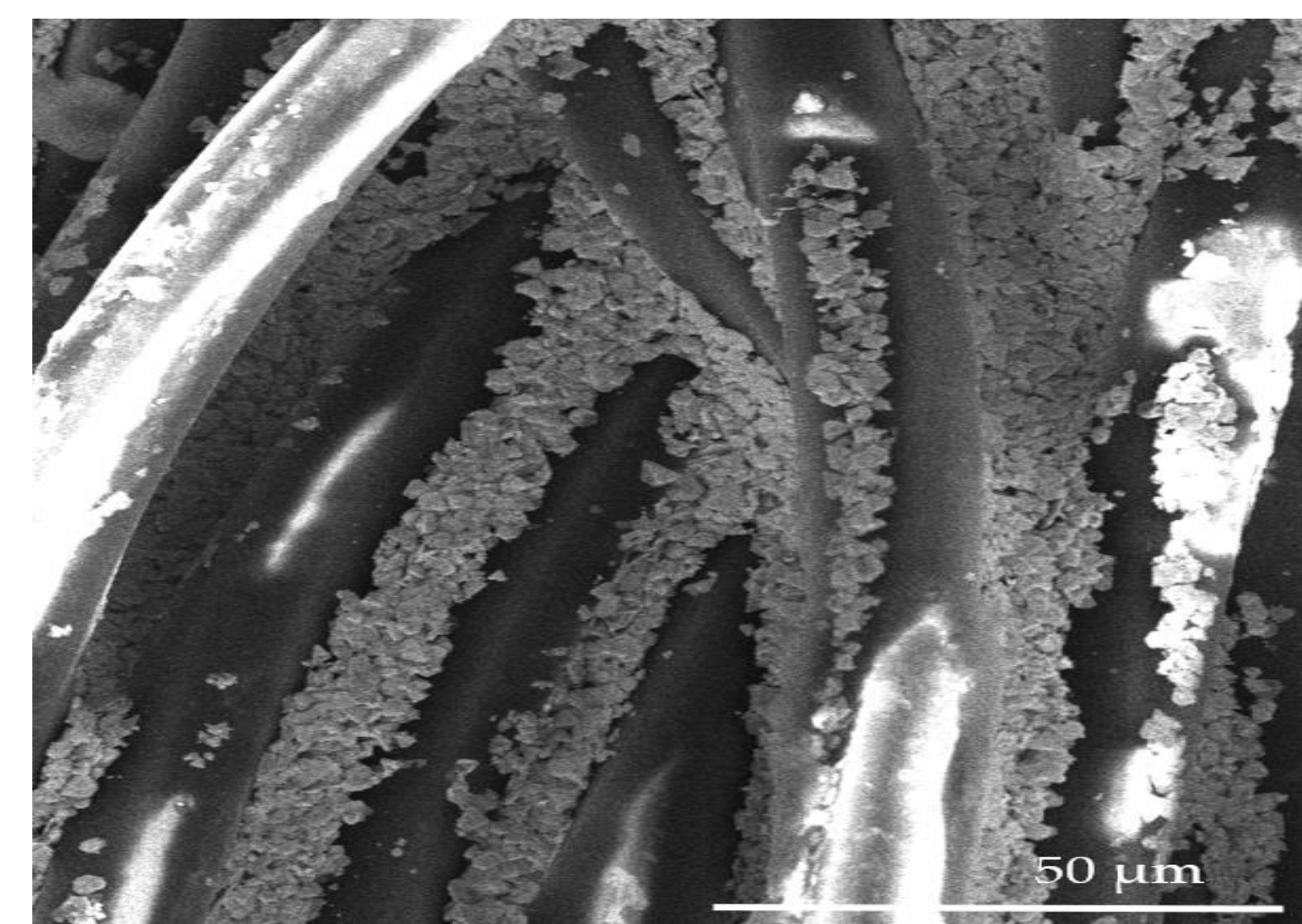
Average surface resistance of silver printed electrodes was $1.78 \pm 0.2 \Omega/\text{Sq}$

After wash it was $3.77 \pm 0.25 \Omega/\text{Sq}$ (2.12 times the original value)

Acquired ECG signals

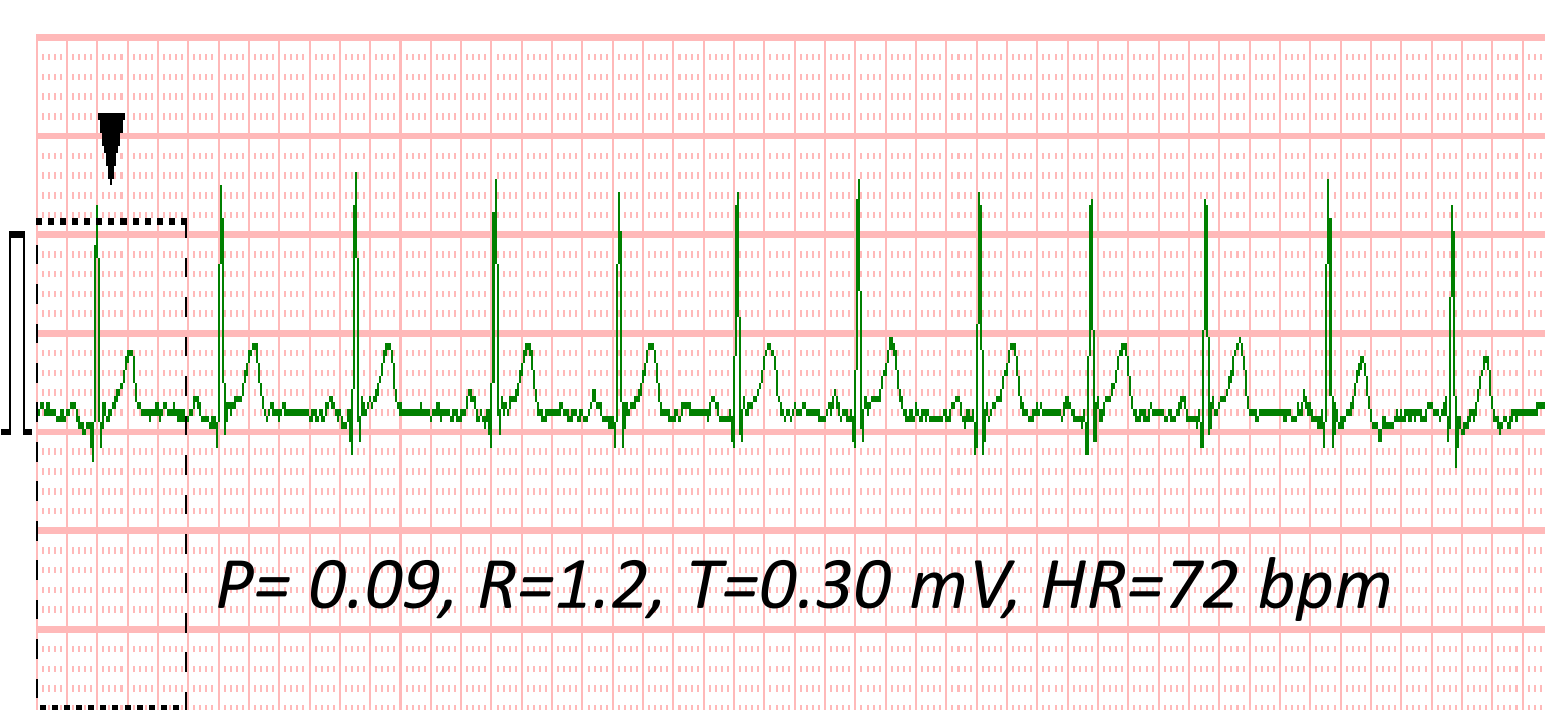
Major peaks are visible in all signals

There is no significant difference with signals from Ag/AgCl and printed electrodes ($p = 0.423$ and 0.963 at $\alpha = 0.01$)

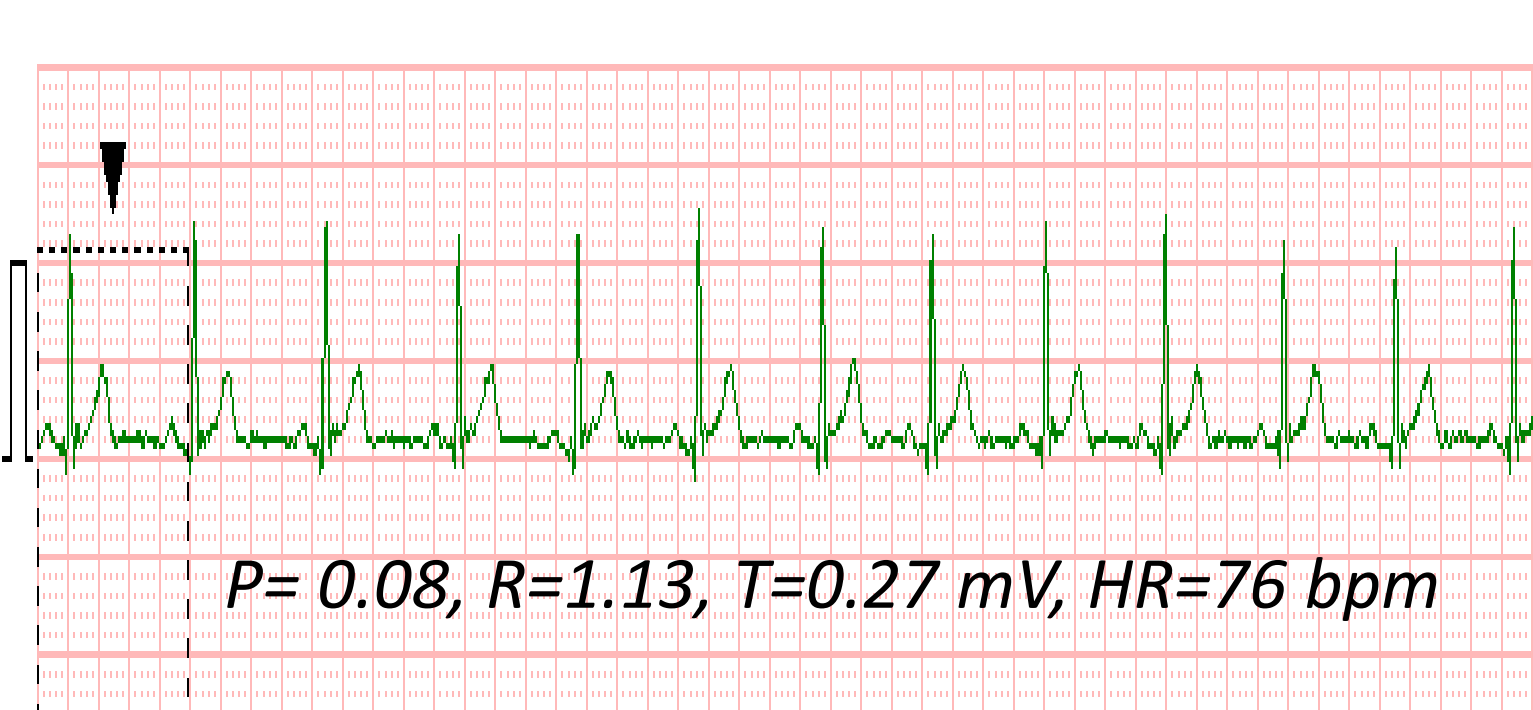


SEM image of high magnification silver particles on polyester

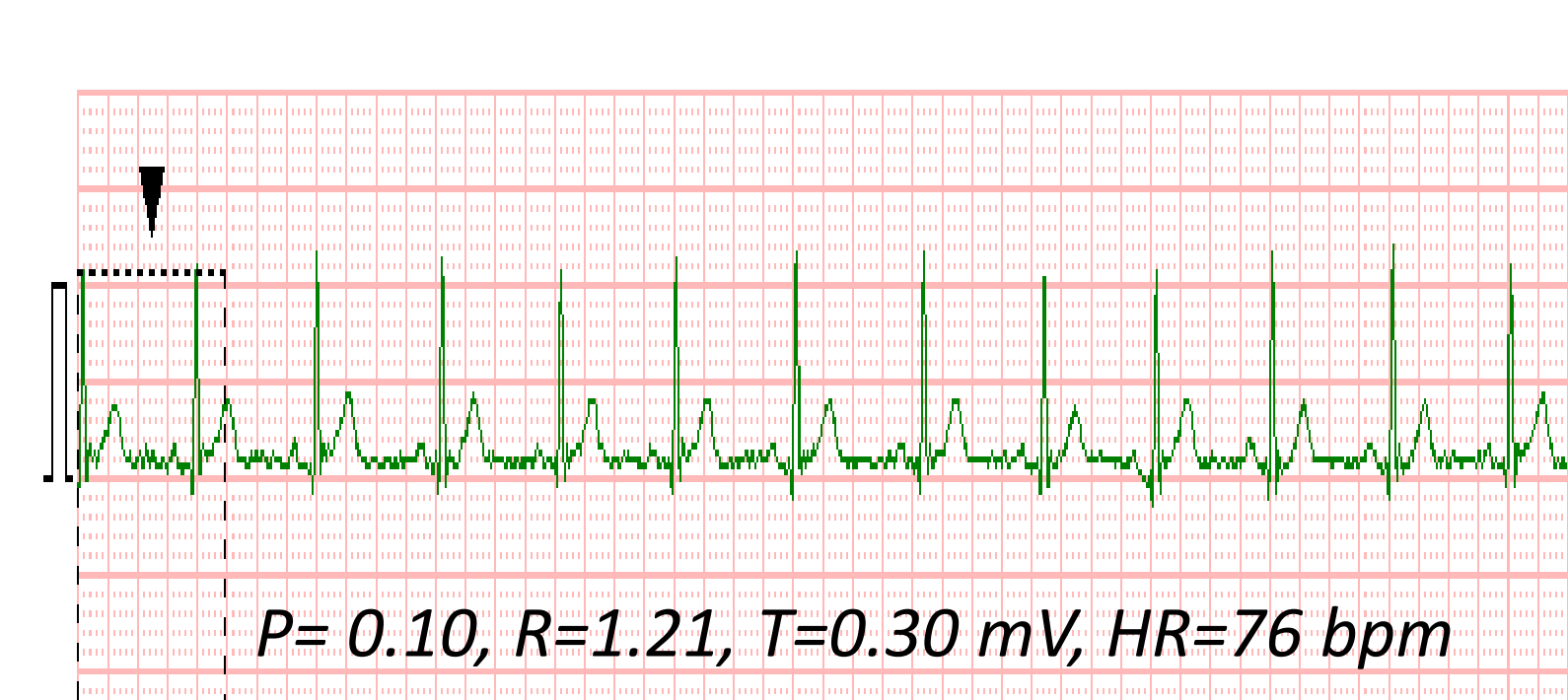
ECG SIGNALS



Signals acquired using silver printed electrodes



Signals acquired using silver printed electrodes after washing



Signals acquired using Ag/AgCl electrodes

Conclusion:

- The textile electrodes were capable to collect ECG signals
- Even though the sheet resistance of the electrode increases after washing, they were able to capture signals with acceptable quality.