

EE-517 Bio-Nano-Chip Design

Student Projects - Progressive Report

Group Number:

Group member names, surnames, and sections:

- Title of the project:

- Introduction (200 words max):

Introduce here the problem/disease.

Include a short description of the state-of-the-art (hint: how others solve the same problem).

Include references (IEEE standard).

- Figure of the proposed system:

Put at least one figure highlighting the system you conceptualized with a short description. (Original work)

Useful tools/software: Biorender (<https://www.biorender.com/>); Microsoft Visio;

- Molecule to sense (200 words max):

Identify the biomarker/biomolecule to be sensed.

- Where to sense (200 words max):

Identify from which biofluid (e.g., whole blood, plasma, serum, sweat, tear, saliva, etc.) you want to sense the chosen biomolecule and state the reasoning. If several biofluids can be chosen (for instance, if the application is glucose measurement, all the stated biofluids can be used), specifically state pros/cons for each (in a table) and then systematically decide based on application requirements.

- Required specifications (200 words max):

Identify the required specification for the particular application, including (but not limited to) linear range, sensitivity, the theoretical limit of detection, and dynamic range.

- Method (200 words max):

Identify the suitable method for detecting the biomolecule in the correct ranges.

- Geometry (100 words max):

Identify the optimal geometry for the designed passive chip.

Calculate the geometrical area.

- Nanomaterials (200 words max):

Identify the nanomaterial(s) that will be deposited on the interface (e.g., surface) to enable a selective and sensitive sense of the target biomolecule.

- Interactions (200 words max):

Identify possible interfering molecules that can reduce the specificity of the chip.

Why do they interfere?

- Prevent Electron Transfer (200 words max):

Which strategies have been applied to reduce the interferences with other molecules during the sensing process?

- Enhance Electron Transfer (200 words max):

Which strategies have been applied to improve the sensitivity of the chip?

Which nano-materials have been used?

Which strategies have been used to deposit the materials? (cleanroom-free processes are favored if applicable)

- Figure of the proposed passive chip design layer-by-layer:

Put at least one figure highlighting the materials that are present in your passive chip with a short description. (Original work)

- Supplementary (no limits):

Simulation results, theoretical derivations.

- Novelty (100 words max):

Identify the **key novelty** of your proposed passive chip.

- References (no limits):

List all the references explored during the state-of-the-art review process in the IEEE template.

- Additional Material (no limits):

i.e., other figures.