

Antimicrobial Peptidomimetics: Design, Synthesis, and Surface Binding

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Issue

- ❖ Antibiotic resistance^[1] -> Threat to global health
- ❖ Effectiveness of antibiotics -> Need of innovation
- ❖ Repeated use -> Promotion of resistant strains

Objectives

- Synthesis of antimicrobial peptides (NON DISCLOSED) with -SH functionality (N-term & C-term)
- Covalent Immobilisation on titanium plates (> 99.6% purity, *Grade II*).
- Characterize through different techniques: FTIR, SEM & XPS

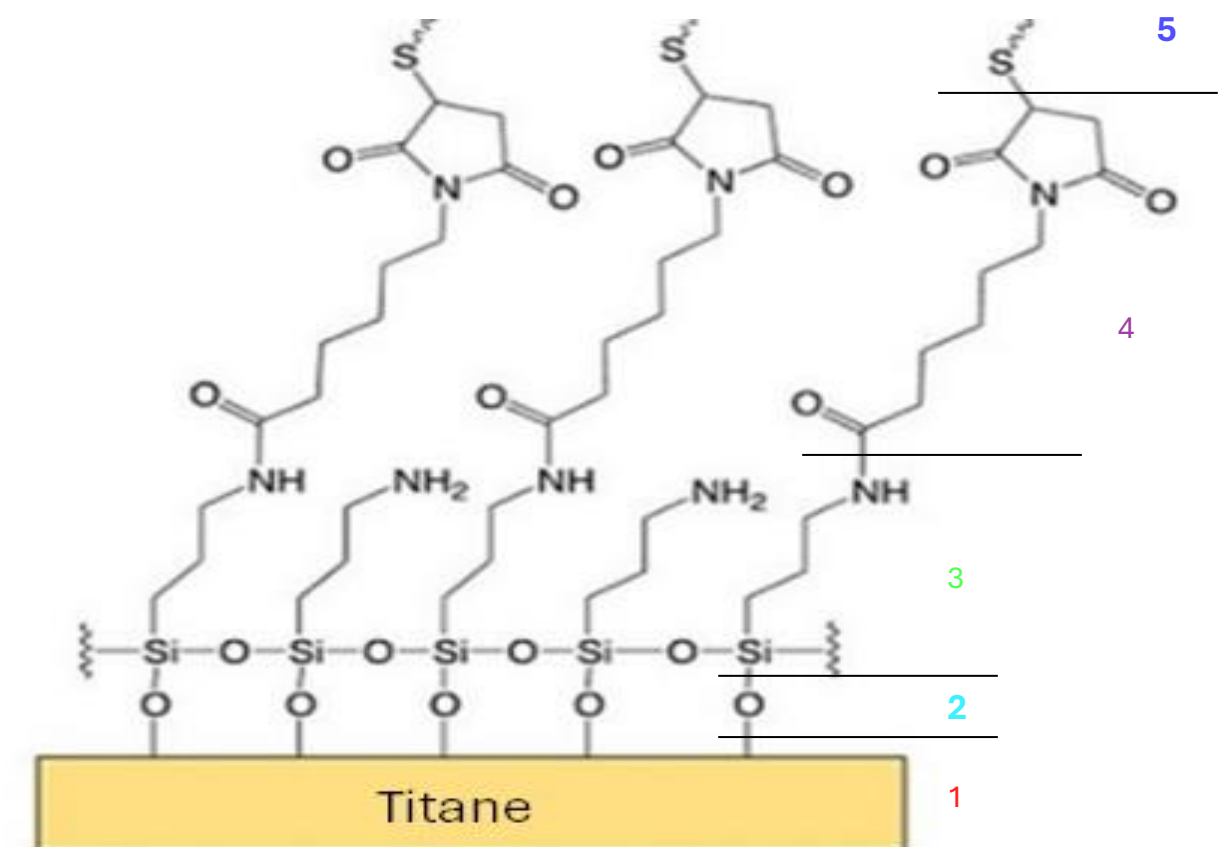
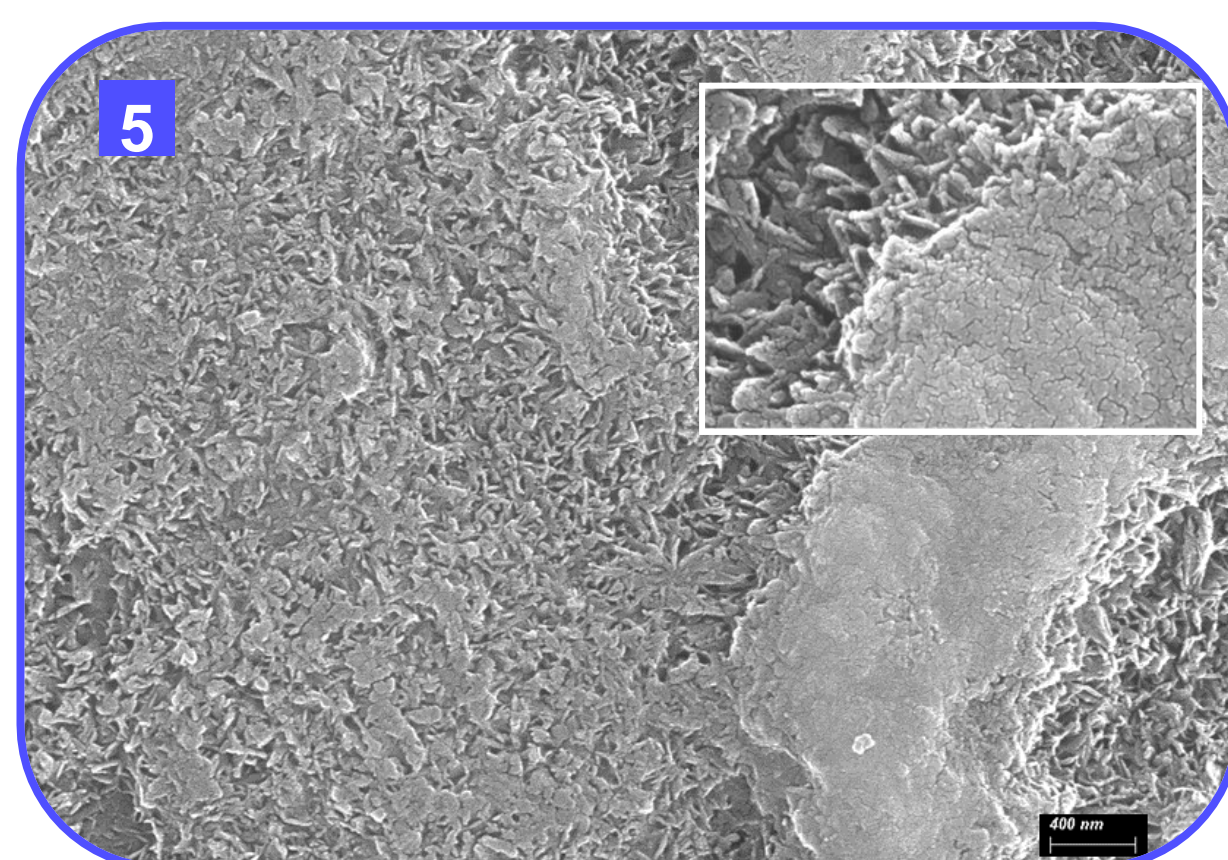
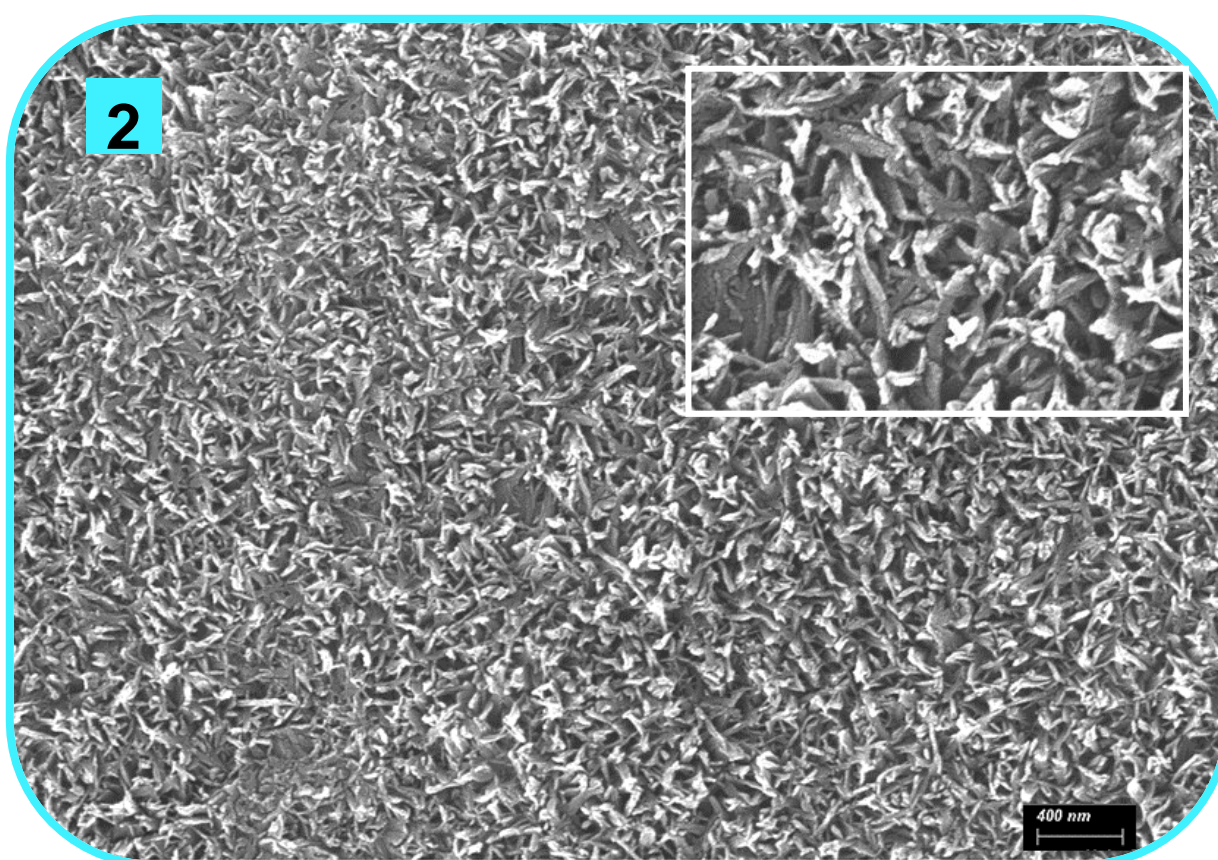


Figure 1: Assembly process on Titanium Surfaces ^[2]

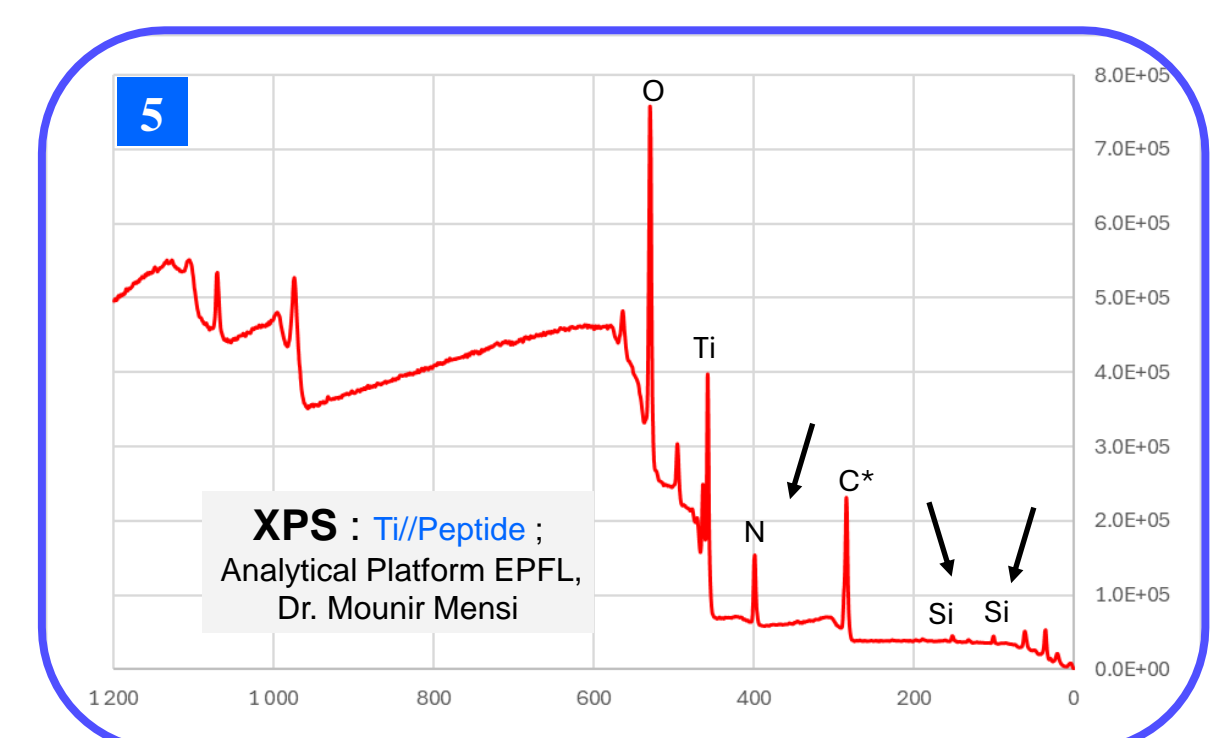
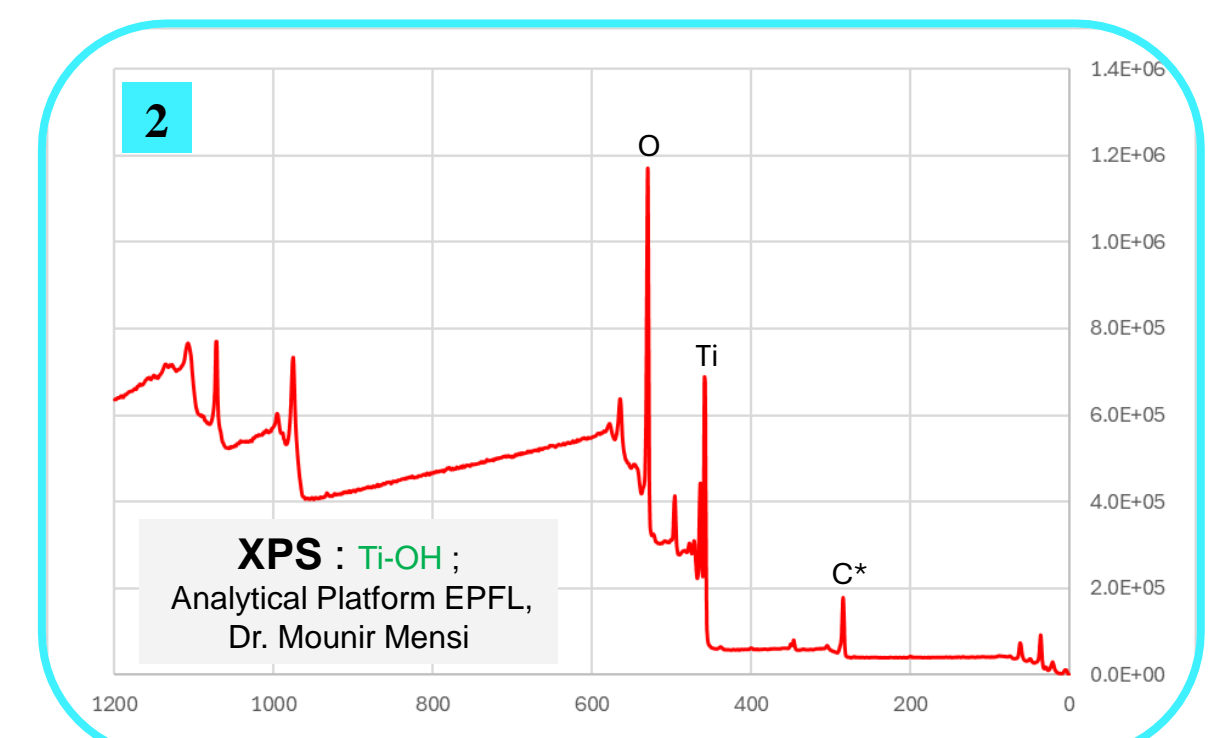
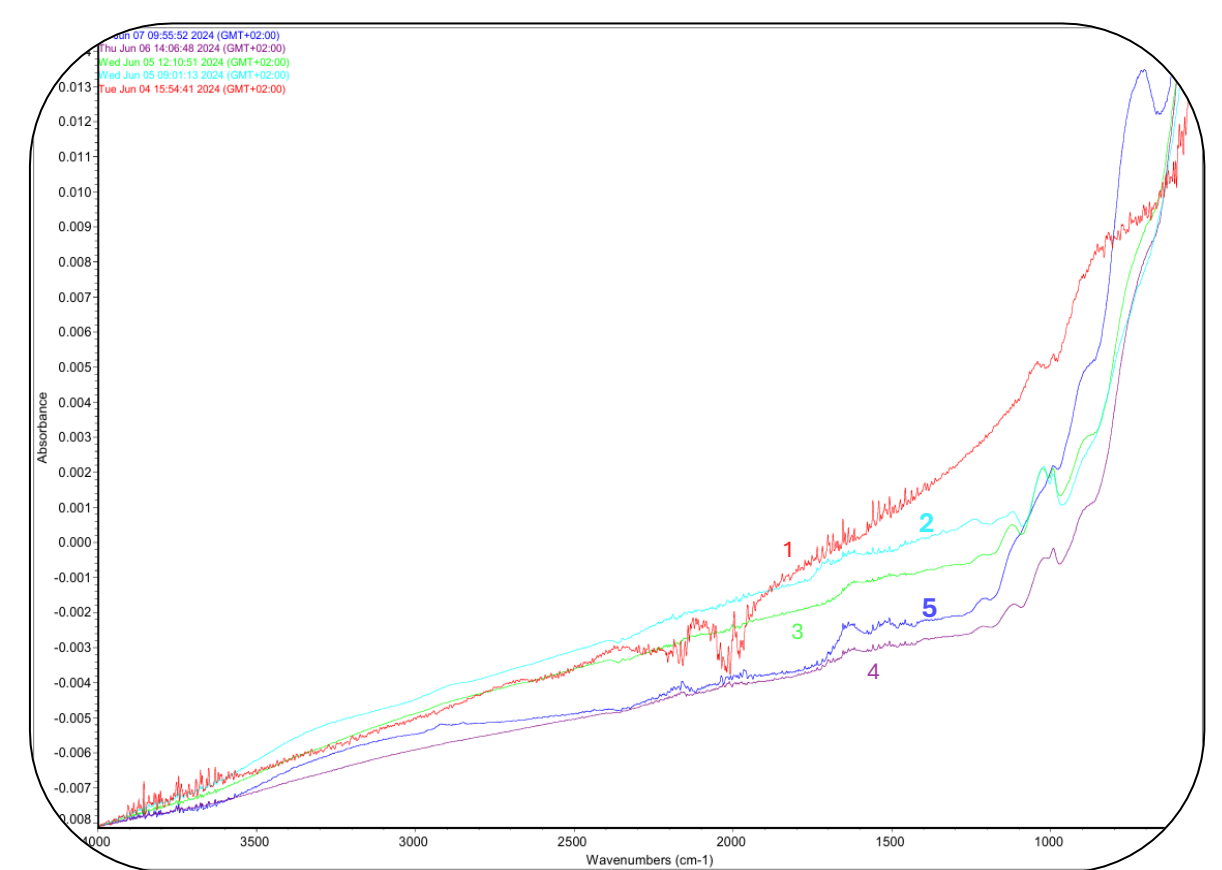
Data & Discussion

- Solid phase peptide synthesis on **PurePep Chorus**, Gyros Protein Technologies.
- Peptide purification on **Agilent 1260 Infinity II** HPLC-preparative.
- Characterization of the peptide on UPLC-MS **Agilent 1290 Infinity II** UPLC-MS.
- Covalent immobilisation of the peptide on a Titanium plate according to strategy **Figure 1** ^[2].
- Characterization of the peptide by FTIR-ATR, XPS and FEG-SEM.



FEG-SEM :Ti-OH (2) and crosslinked with Peptide (5) @20'000x and 100'000x (inserts) ;
 by Hervé Girard, internal service platform HES-SO/Valais

The surface binding strategy went smoothly, confirming the binding of the peptides to the titanium surface. Following immobilisation, the sequences with C-Term Cys gave better binding to the titanium surface, while our sequences with N-Term Cys had tendency to form mainly dimers, which limited its binding efficiency to the plate. Of the three characterization methods used, XPS proved to be the most effective. Thanks to its high resolution and accuracy, XPS enabled in particular precise identification of the elements present on the surfaces, although initial carbon (C*) traces remained visible throughout the different analyses, likely an original contamination.



Litterature

1. www.who.int/news-room/fact-sheets/detail/antibiotic-resistance
2. B. Mishra et G. Wang, vol. 33, no 7, p. 544-555 (2017), doi: 10.1080/08927014.2017.1332186.
3. **Bachelor Thesis HES-SO/Valais** by Virginie Briguet, August 2024 , « *Peptides antimicrobiens adhésifs : synthèse et caractérisation* »