# WP1b DESCRIPTION

## 1. Introduction

The EASIMECA project aims at assessing a micro-tensile test bench that have been developed by the CNES and ELECMA (formerly NOVAMEMS and FIALAB) to characterize the mechanical properties of nanostructured materials. The innovative aspect of the experimental set-up relies on the fact that mechanical testing is performed on freestanding thin films (figure 1), thus enabling the direct measurement of the intrinsic properties of the materials without the influence of the supporting substrate and/or interface.

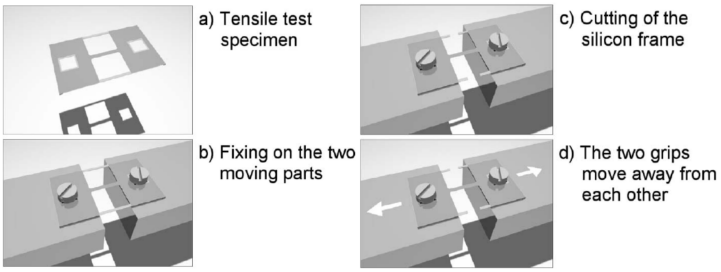



*Figure 1. Picture of the micro tensile testing device (first prototype which will be further developed in the framework of this project) and specimen fixation and testing procedure.*

## 2. Work to be performed by LAAS: Development of etching procedures

The workplan aims at developing procedures for the preparation of freestanding structures for the selected materials. Associated tasks include:

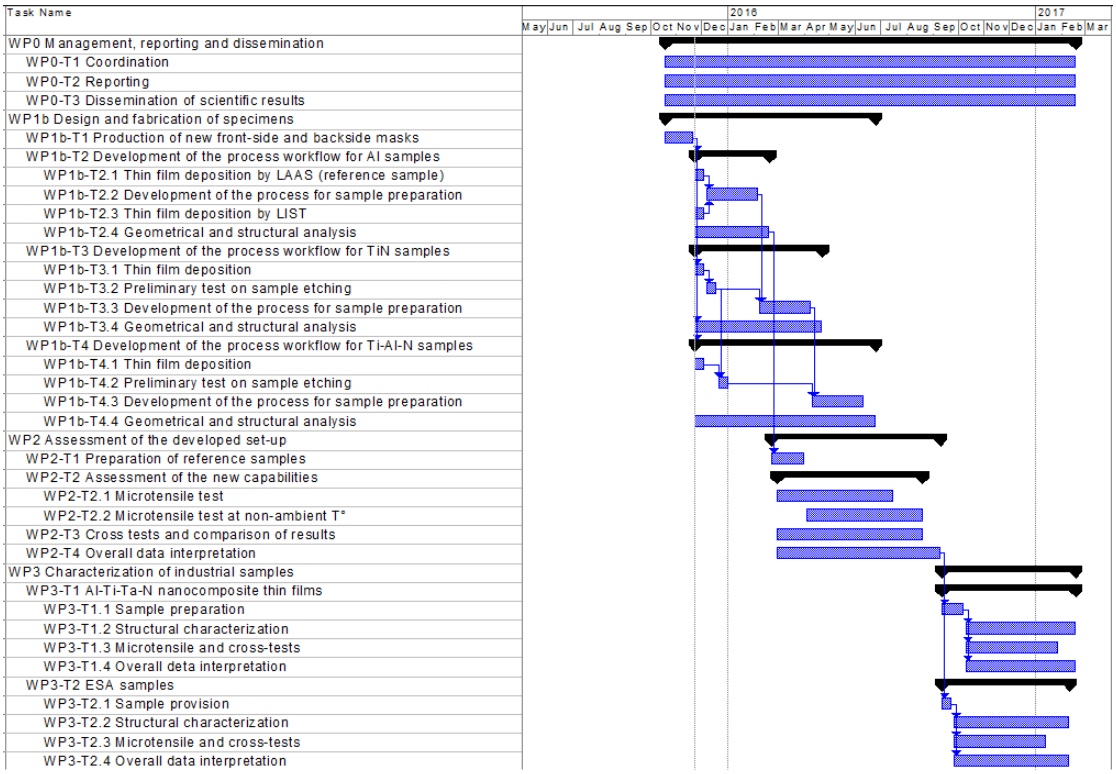
- The production of new front-side and backside etching masks with optimized design
- The substrate provision, according to etching procedures
- The development of qualified etching procedures for the following materials :
  - Metal: Al or Cu
  - Ceramics: TiN
  - Nanocomposite thin films: Al-Ti-Ta-N
- The production of freestanding structures for tensile testing. The table 2 summarizes the configurations that are to be produced to achieve the initial workplan.

| Nature | Process | Epaisseur | Test µ-traction | Nbre wafers |
|---|---|---|---|---|
| Al | Evap LAAS | 1 micron | T amb | 1 (2) |
| Al | Evap LAAS | 1 micron | haute T | 1 |
| Al | MS CRPGL | 1 micron | T amb | 2 |
| Al | MS CRPGL | 500 nm | T amb | 2 |
| TiN | MS CRPGL | 1 micron | T amb | 2 |
| TiN | MS CRPGL | 500 nm | T amb | 2 |
| TiAlN | MS CRPGL | 1 micron | T amb | 2 |
| TiAlN | MS CRPGL | 500 nm | T amb | 2 |

*Table 1. Samples configurations to be produced.*

### 3. Gantt chart

The following figure presents the FORECASTED project timeline.




In this general framework, LAAS will be in charge of the following tasks:

- WP1b-T1: production of new front-side and backside masks
- WP1b-T2.1: Thin film deposition (Al)
- WP1b-T2.2: Development of the process for sample preparation (Al)
- WP1b-T3.2: preliminary test in sample etching (TiN)
- WP1b-T3.3: Development of the process for sample preparation (TiN)
- WP1b-T4.2: preliminary test in sample etching (Ti-Al-N)
- WP1b-T4.3: Development of the process for sample preparation (Ti-Al-N)

### 4. Deliverables

LAAS will deliver the following deliverables:

- Samples: freestanding structures with configurations according to table 2.
- A progress report every 2 months, including the work performed during the period as well as main achievements, problems encountered, updated Gantt chart
- A final test report at the end of the activity which will include
    - A description of the new masks
    - A description of etching procedures and tests performed during the procedure development