Elaboration de structures périodiques diffractives à base d'oxydes métalliques par nano-impression UV et thermique

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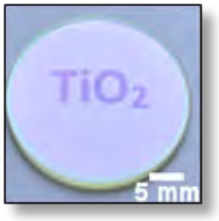
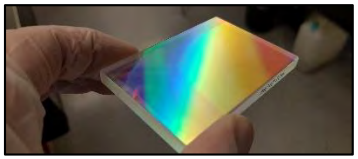
Sommaire

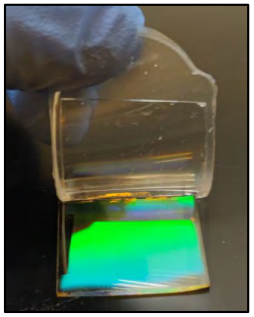
- Preparation des films d'oxyde métallique



- Procédés de micro-nanostructuration utilisés au LabHC



- Procédé de nano-impression UV



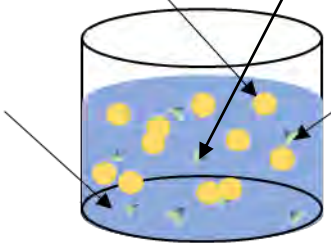
- Conclusions et perspectives

Élaboration de films minces d'oxyde métallique

Précurseur métallique (Ti, Si, Zr …)

Agent complexant (ex : BzAc, AcAc …)

Solvants
Acide



Complexe [Précurseur + agent complex.]

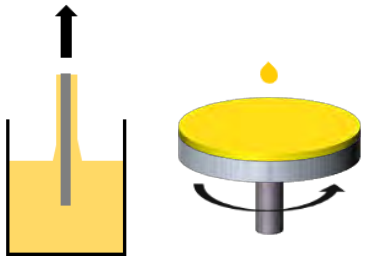
Solution mère

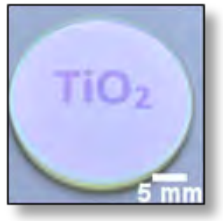
Précurseur métallique + solvants + acide

+

Solution fille

Précurseur métallique + complexant + solvant





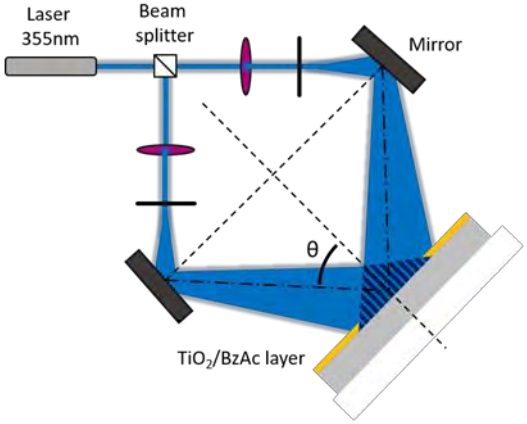
1. Préparation du xérogel d'oxyde métallique

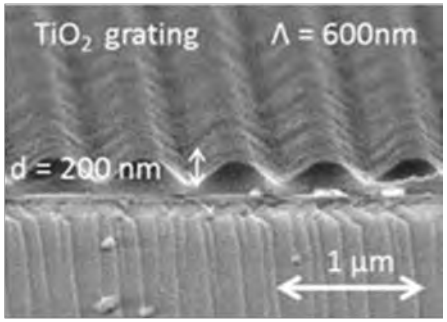
2. Dépôt du xérogel par dip / spin-coating

3. Film mince d'oxyde métallique

Sol-gels photogravables ➔ Compatible avec différentes techniques de lithographie / embossage

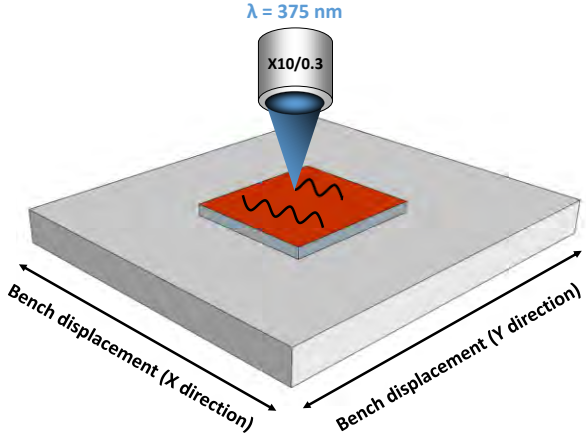
Lithographie interférentielle (LIL)

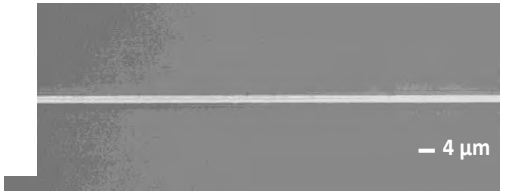




Ecriture laser directe

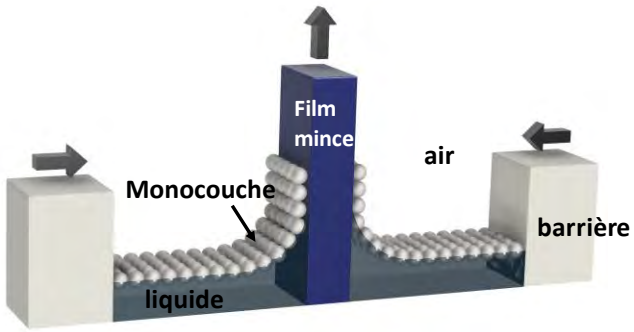
Dilase 750 de la compagnie Kloé

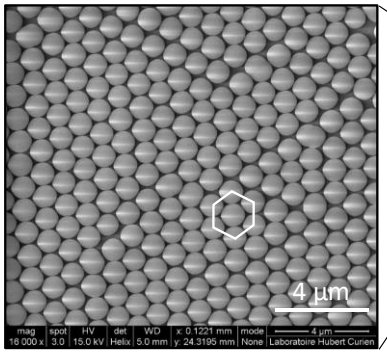


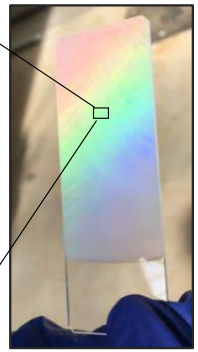


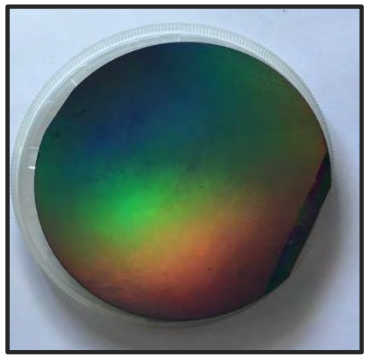
Lithographie colloïdale

Etape 1 : Dépôt billes Langmuir-Blodgett

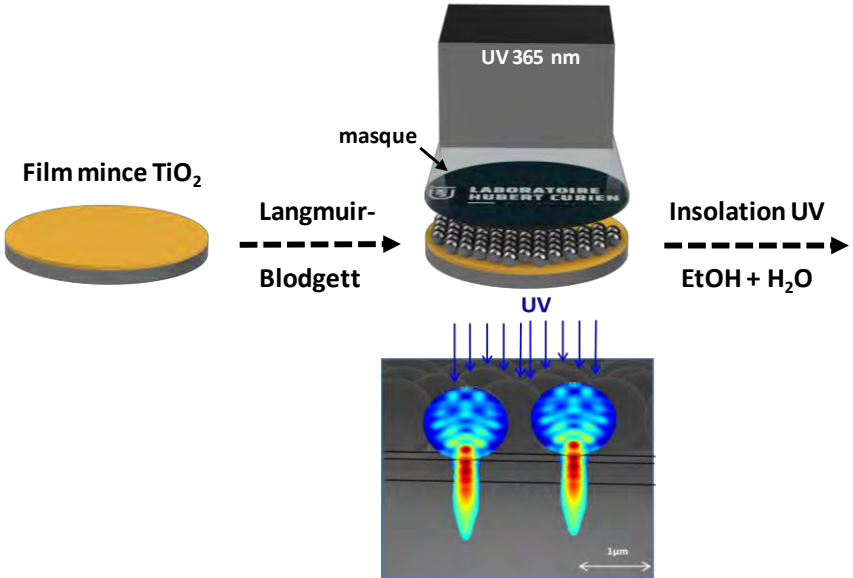


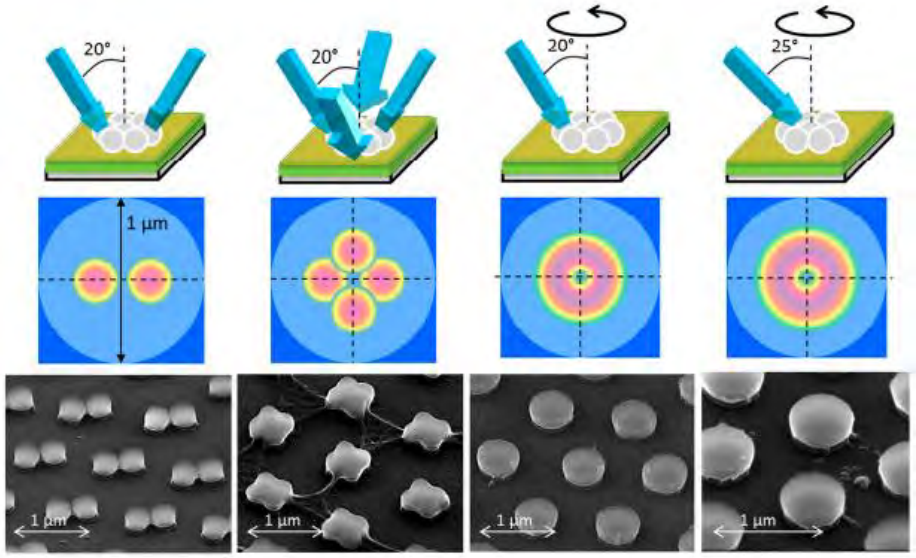






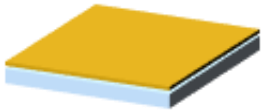
Etape 2 : Lithographie colloïdale



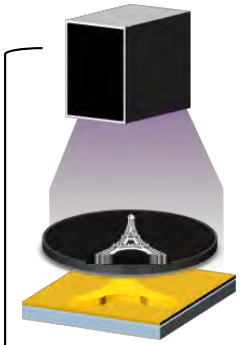


Lithographie UV multi-échelles

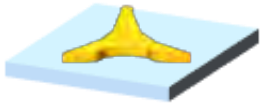
Film mince TiO_2



Insolation UV

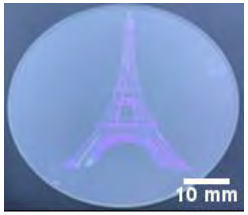


$EtOH + H_2O$



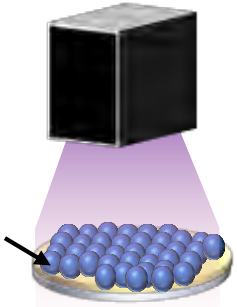
Couches de TiO_2 avec motifs

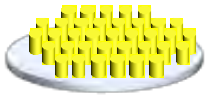
Echelle Macro



combinable

Billes Silice
(↔ 200 et 1µm)



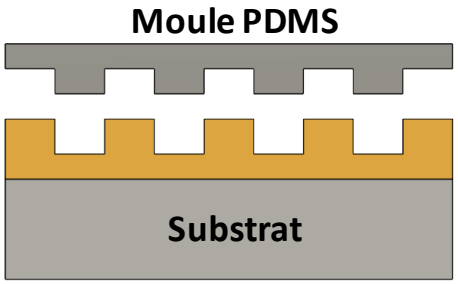


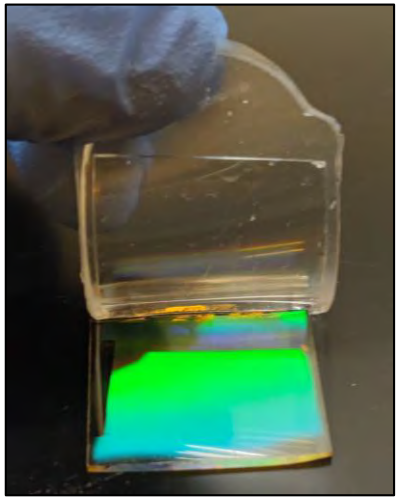
Nano-plots TiO_2

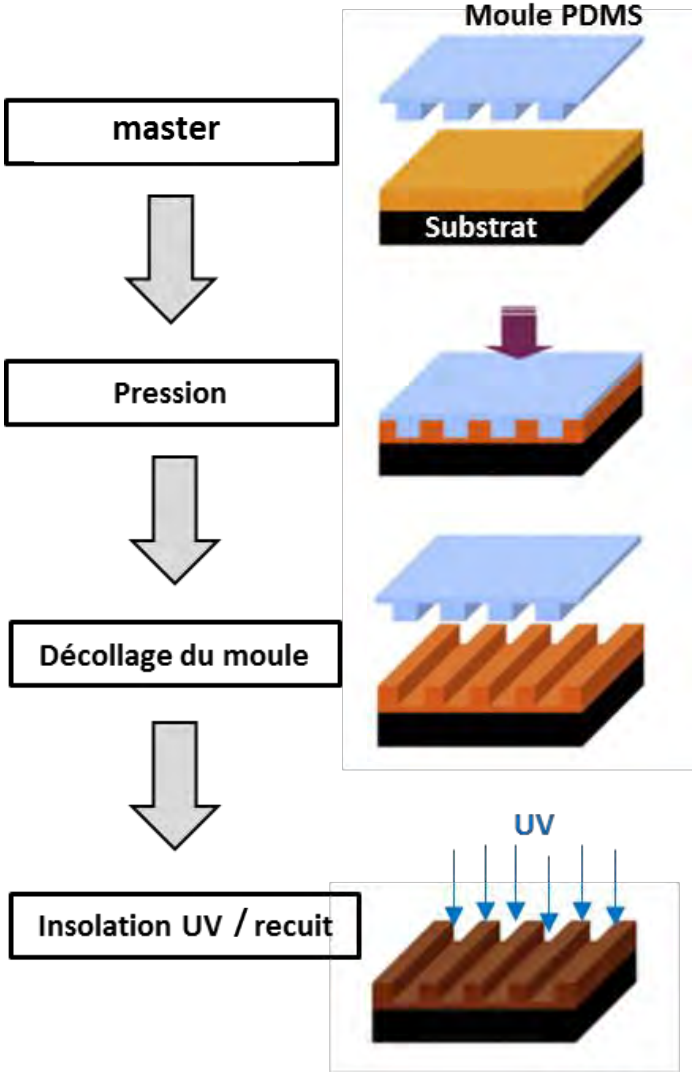
Echelle Nano

Embossage de films minces d'oxyde métallique

Sol-Gel / résine

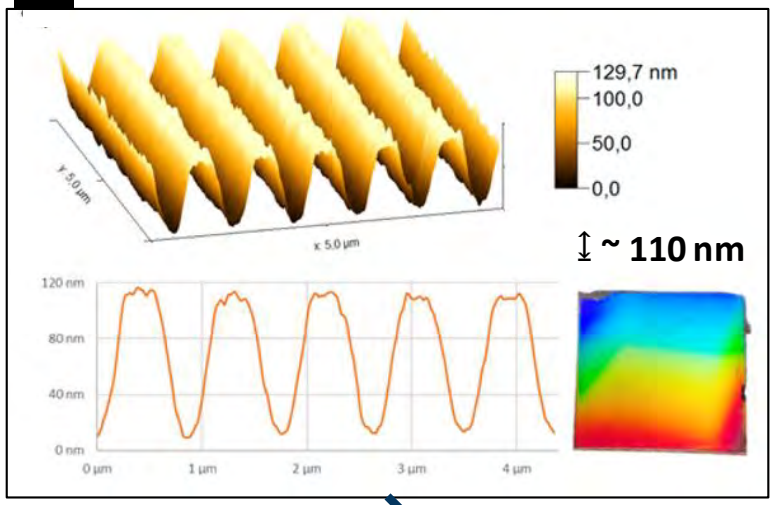




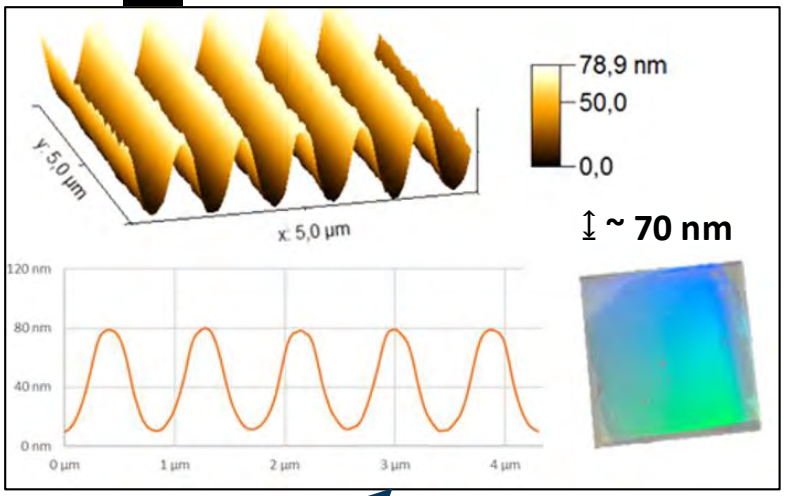


Caractérisation des échantillons (AFM)

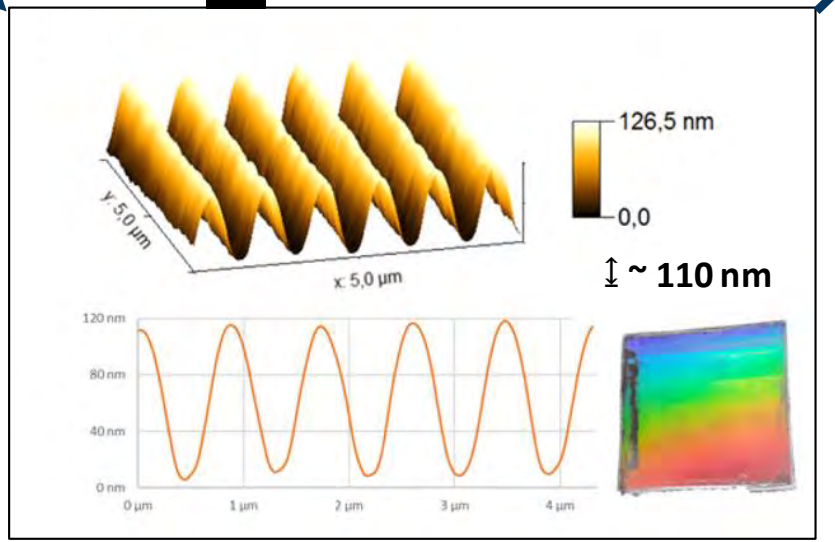
1 Master (résine photosensible)



3 Réplicat (TiO_2)



2 Moule (PDMS)



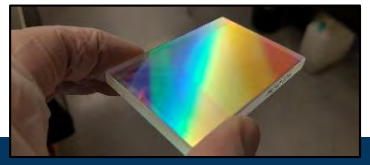
Conclusions

- **Réalisation de solutions par voie sol-gel photogravables / embossables**
- **Fabrication de masters par différentes techniques (LIL, LC, écriture laser directe…) pour la nano-impression**

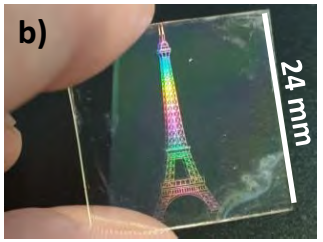
Perspectives

- **Poursuite du développement sol-gel embossable (ZrO_2 - HfO_2 - SiO_2 …)**
- **Master avec structures périodiques autres que réseaux linéaire de diffraction (plots, motifs complexes…)**
- **Réalisation de masters grandes dimensions (LIL, LC et écriture laser directe)**

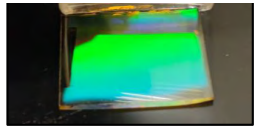
a)



b)



Elaboration de s
d'oxydes métalliq



Merci pour votre attention