



# Mechanical Strength Enhancement of Ti/Au Layered Structure Evaluated by Micro-Bending Test

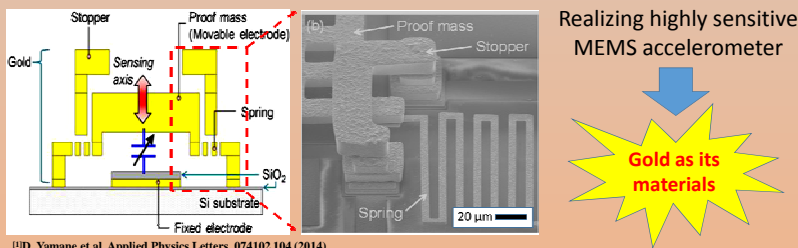


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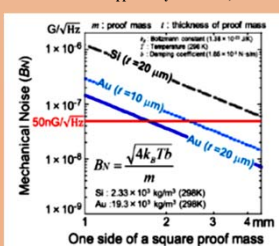
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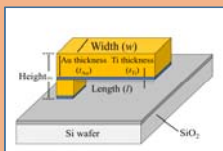
## Introduction



<sup>[1]</sup>D. Yamane et al. Applied Physics Letters, 074102 104 (2014)



**Disadvantage:**  
Soft metal  
Yield stress:  
50-200 MPa



<sup>[2]</sup>M. Teranishi et al. Microelectronic Engineering 159 90-93 (2016)

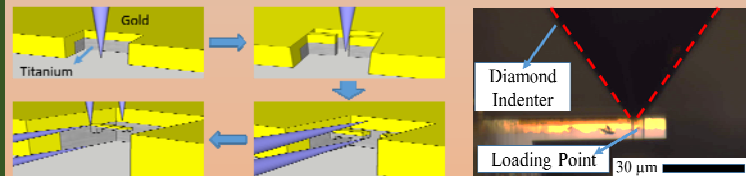
Ti/Au two-layered structure may enhance stability of the movable structure and reliability of materials

Preliminary study using COMSOL Multiphysics was carried out and stability of the structure increased

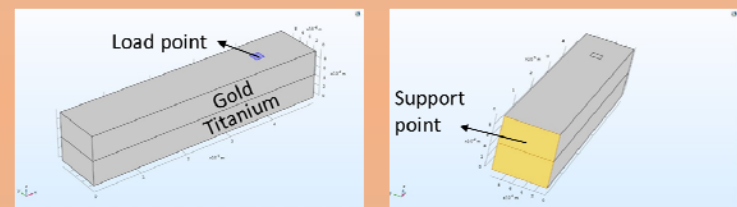
Micro-bending evaluation of the strength enhancement contributed by the Ti-Au bi-layered structure

## Experimental Method

### 1. FIB Fabrication and Micro-Bending Test

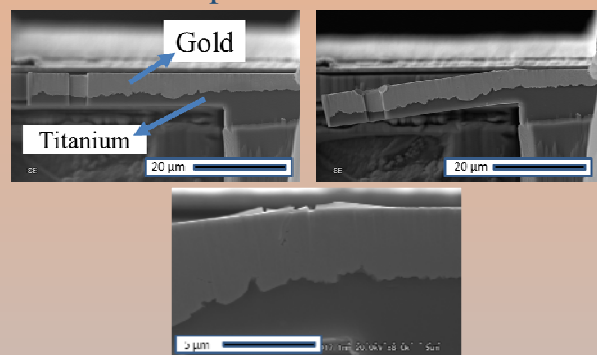


### 2. COMSOL Multiphysics FEM analysis

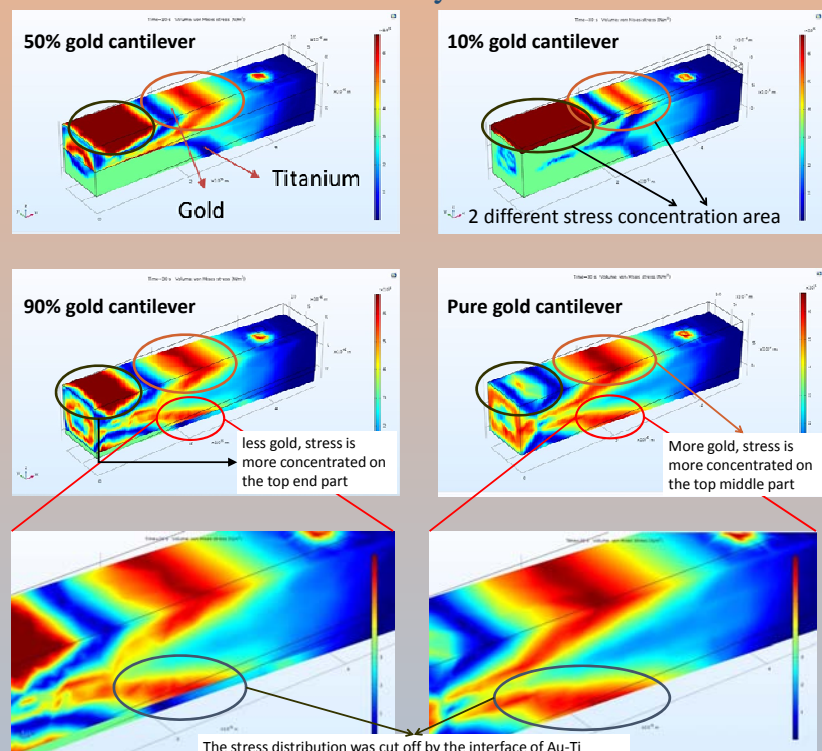


## Results and Discussion

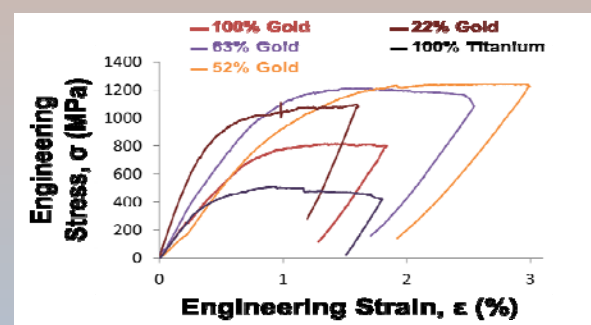
### 1. Cantilever specimen before and after bending



### 3. Von mises stress FEM analysis results



### 2. S-S curves of all fabricated cantilevers



- Incoherency between the two metal layer
- Gold has smaller grain size than titanium

- Different stress distribution was observed for different thickness ratio

## Conclusions

- Enhancements in the yield strength were results of the interface layer and better stress distribution.
- Specimen with higher gold ratio showed higher yield strength because strength of the electrodeposited gold is higher than the cold-rolled titanium.

## Acknowledgement

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