A Controlled, Mechanical Method For MEMS Decapsulation

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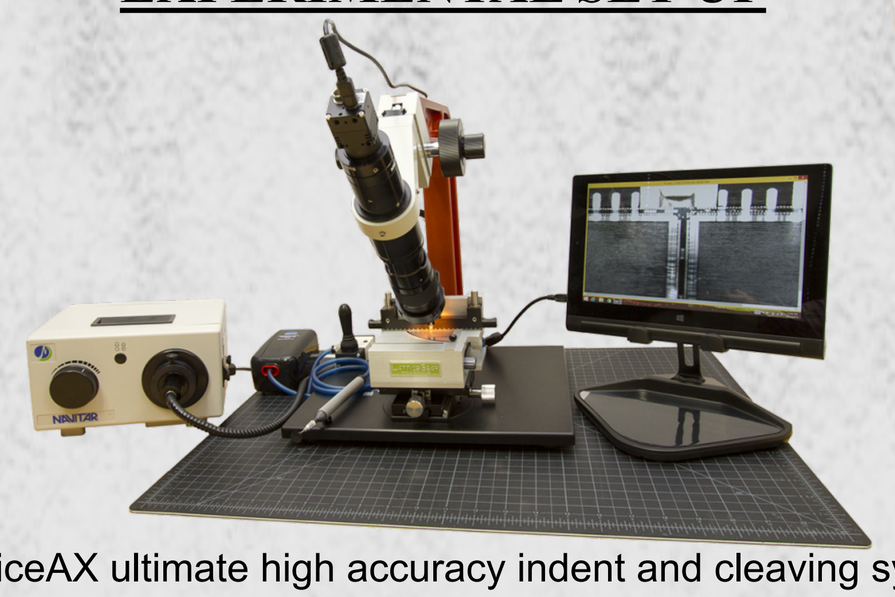
INTRODUCTION

Failure analysis (FA) on MEMS devices involves decapsulate the bonded MEMS device. If the decapsulation is destructive and/or contaminating, it will affect the analysis and lead to wrong conclusions consequently.. Therefore, it is of great importance to establish a reliable (with high success rate and least damages/risks) approach for MEMS decapsulation.

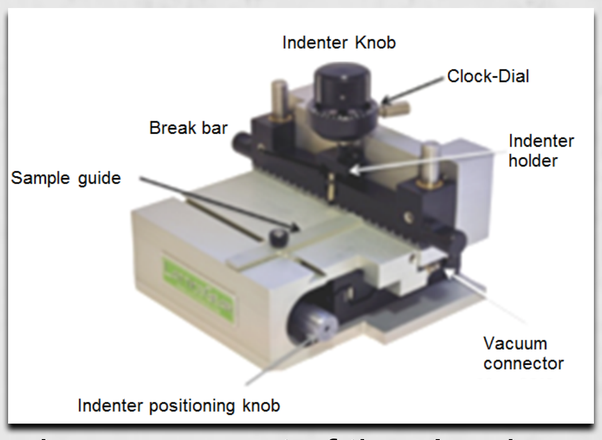
DECAP PROCESS DETAILS

- The user firstly places the MEMS device onto the stage, with the interface line parallel to the wedge cutting line direction.
- After that, the user positions the 10-µm diamond indenter wedge tip right above the interface between the cap and MEMS/CMOS layers by using the indenter positioning knob. Once aligned well, the wedge tip is lowered down towards the device with by turning the indenter knob.
- When the tip is in contact with the device, the decapsulating force can be controlled or adjusted manually by changing the finger torque applied to the indenter knob. As the force reaches a certain level, the indenter wedge will separate the MEMS/CMOS and cap parts quickly.
- A sticky tape can be placed under the MEMS device to prevent the separated parts from bouncing off, which also helps to hold the MEMS device in position.

EXPERIMENTAL SET UP

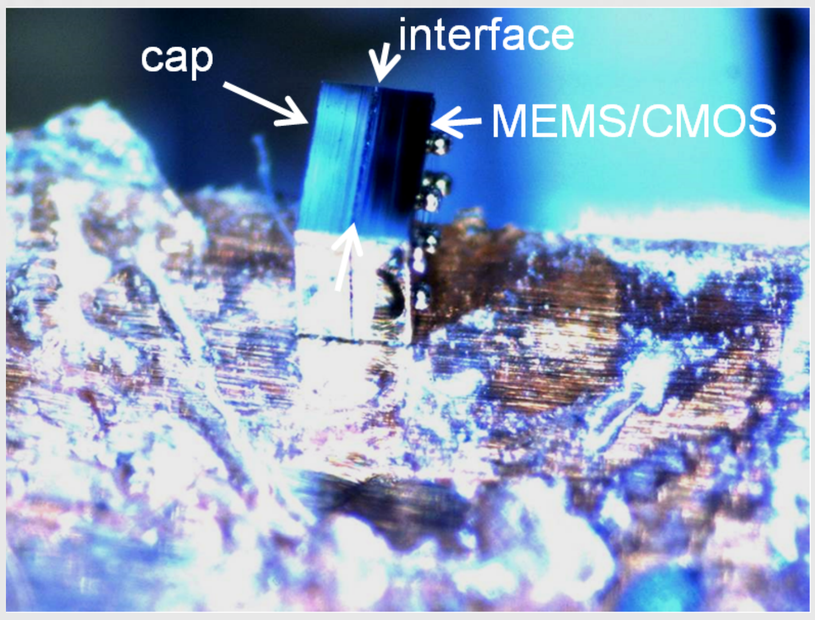


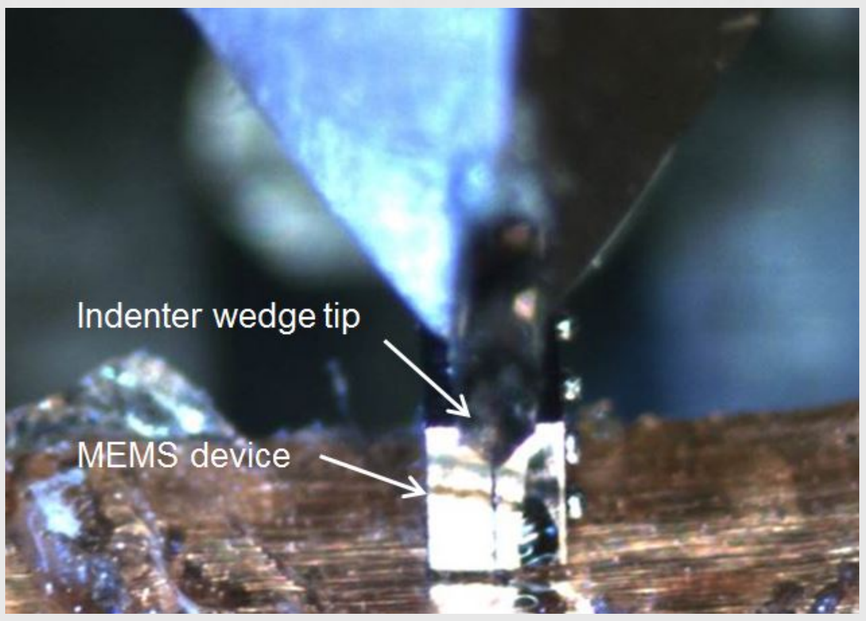
The LatticeAX ultimate high accuracy indent and cleaving system.

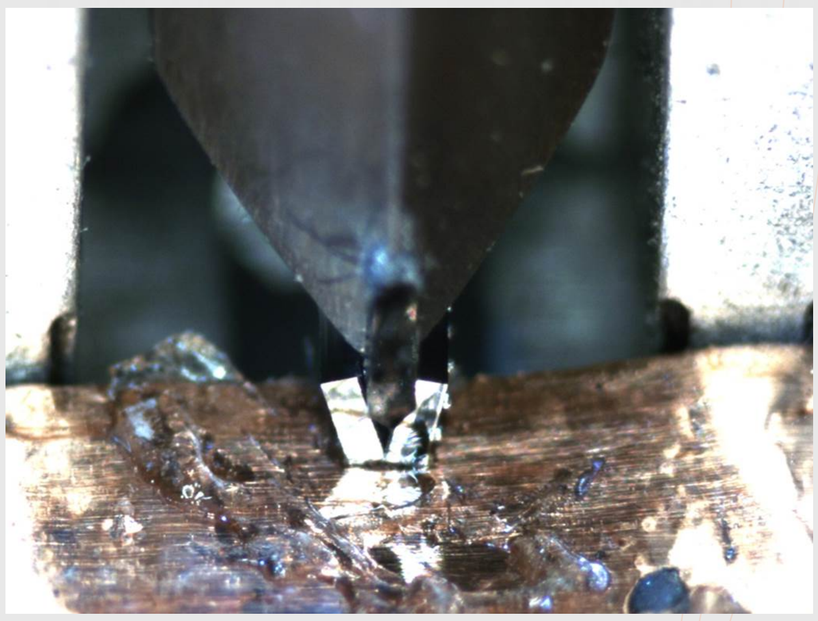


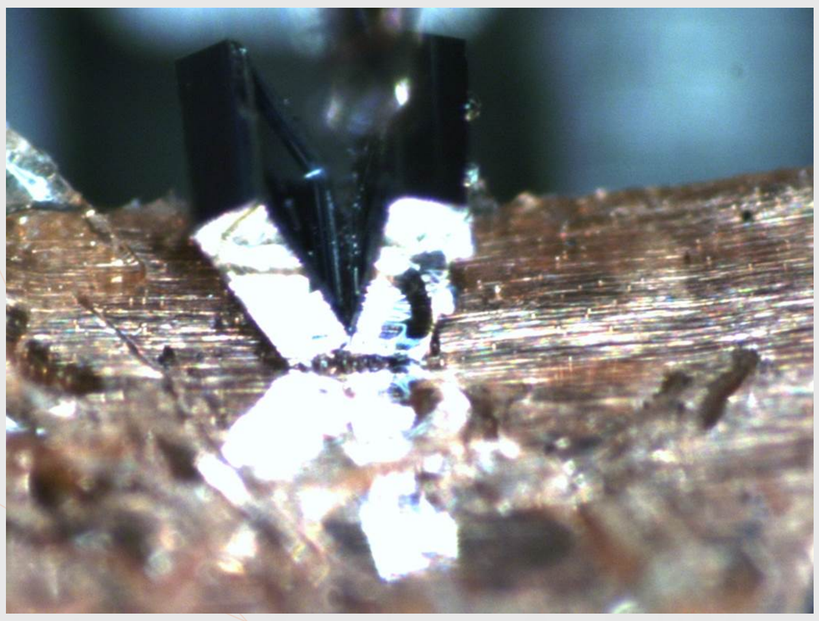
The major component of the cleaving system.

EXAMPLE & CONCLUSION









- **CONCLUSION:** The current approach is clean, simple and no additional heating or chemical etching processes are involved. It is highly efficient as the whole process can be completed within minutes. Moreover, the current approach is visually guided and thus the user can have full control of how much force to be applied and where to apply the force. Consequently, the success rate is near 100% and a new user can grasp the technique within short time. It is safe and ideal for decapsulation of MEMS units and has been proven to be very efficient and useful in our MEMS FA cases.

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