

How Spaceflight Affects the Detachment of Zinc Whiskers

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Zinc Whiskers

- Microscopic, crystalline structures that may form on zinc-electroplated or zinc-galvanized surfaces [3]
- Electronics failures can ensue from conductive whiskers bridging electronic components [1,2]

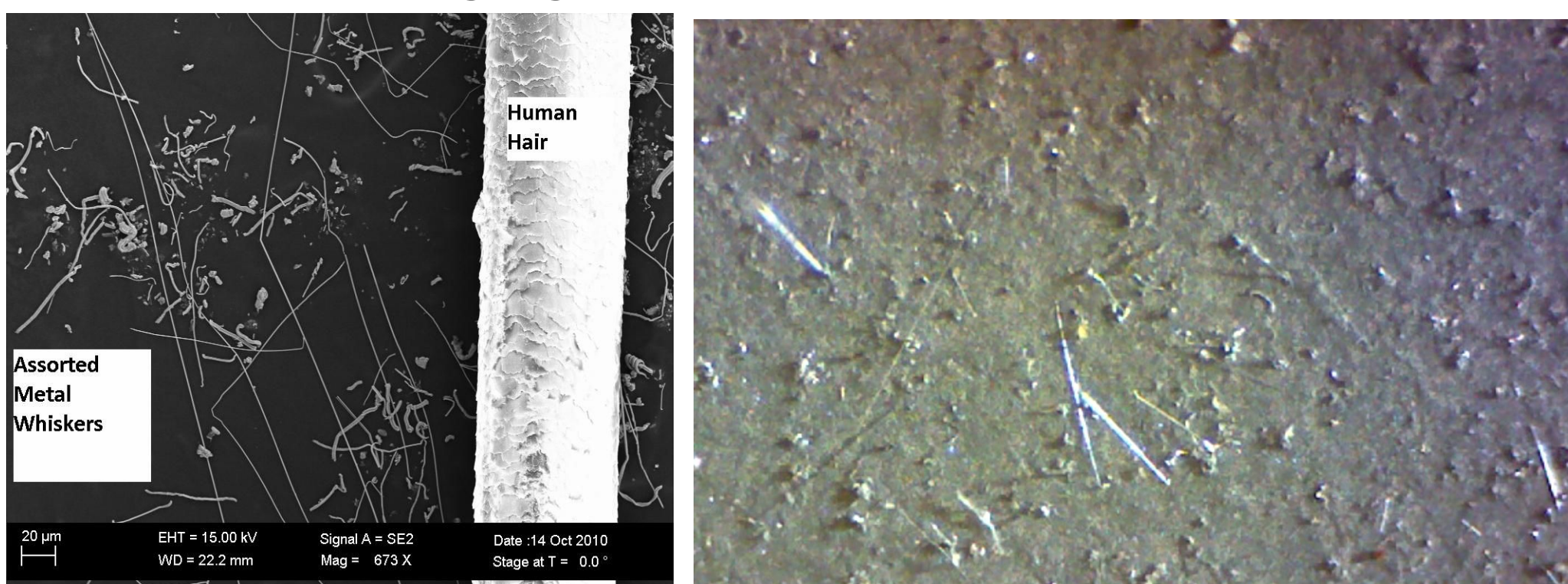


Figure 4 (Left): Sample and double-sided carbon fiber tape secured in Fluid Mixing Enclosure (FME).



Figure 5 (Left): February 19, 2017 - Mission 9 experiment was delivered to the International Space Station (ISS) via SpaceX CRS-10

Preliminary Discoveries

- Fragmenting of whiskers may have occurred due to stresses of spaceflight
- Greater fragmentation occurred near area of sample placement in middle of FME
- Air pockets, creases, and carbon fiber increased difficulty in lighting and analyzing



Figure 6 and 7 (Left, Right): Microscopic view (40x) of carbon fiber tape that surrounded the sample

Method

- Study focuses on the detachment of zinc whiskers on a zinc-whiskered floor tile sample through the rigors of spaceflight
- Systematic photographic analysis of sample and double-sided carbon fiber tape that surrounded the sample in its Fluid Mixing Enclosure (FME)

Experimental Sample

- Provides unique perspective on zinc whiskers that focuses on detachment rate of zinc whiskers in spaceflight conditions
- 132 Whiskers were identified during pre-launch analysis

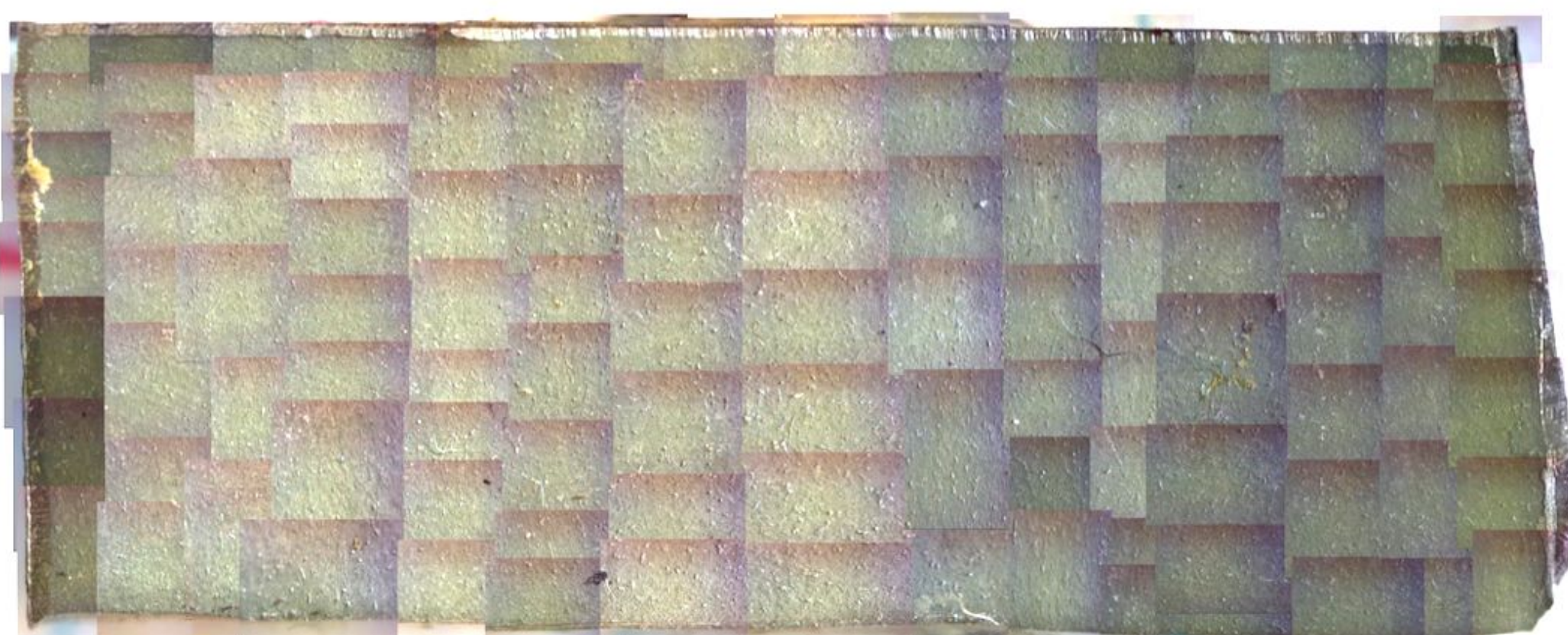


Figure 3 (Above): 1 x 2.5 cm donated zinc-whiskered raised access server room floor tile from NASA Goddard Spaceflight Center

Future Work

- Complete systematic microscope imaging of post-flight sample for comparison
- Use scanning electron microscope (SEM) for analysis of whiskers on carbon-fiber tape and floor-tile sample
- Detailed write-up to Goddard scientists to disseminate results of experiment

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