



# Lockpicking Forensics

datagram  
datagram.layerone@gmail.com  
LayerOne 2009

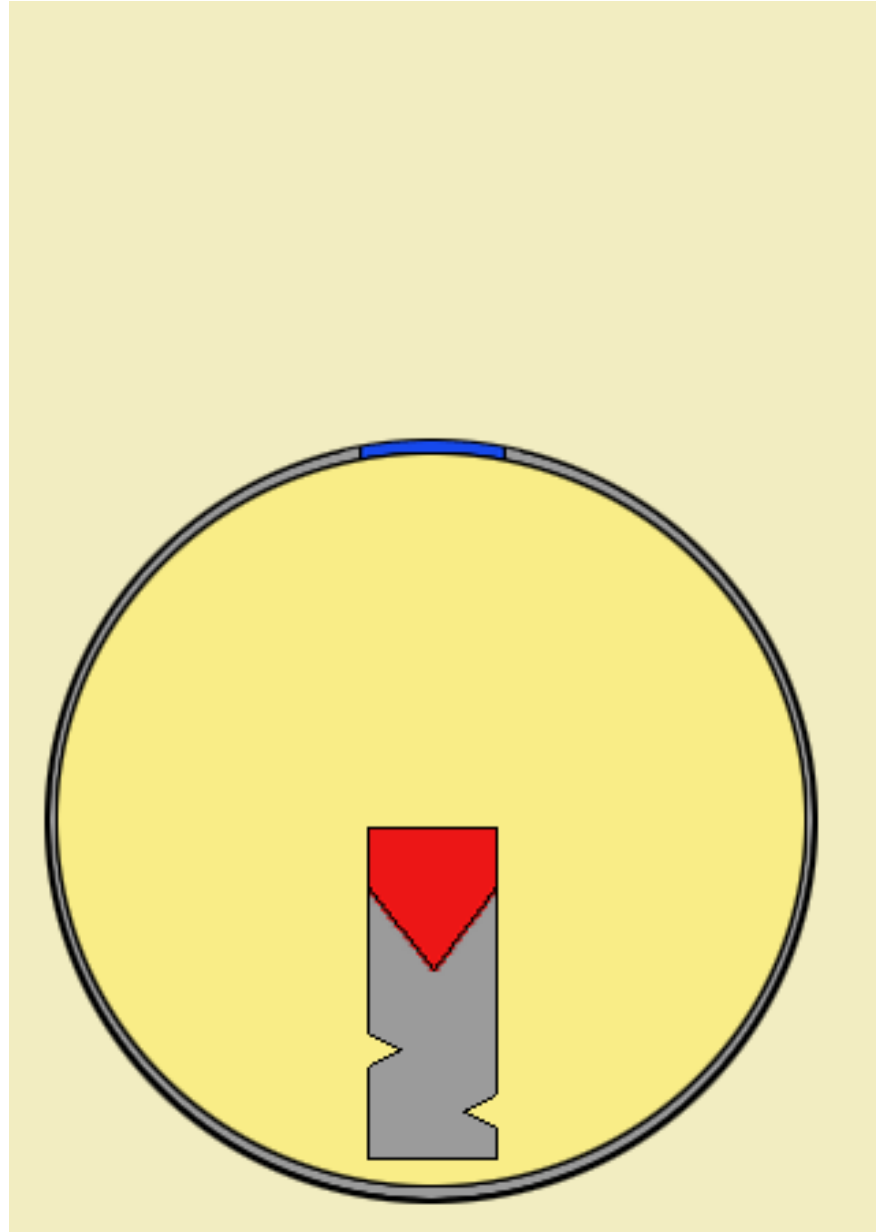
# Agenda

- How locks/picks work
- Normal wear
- Lock Analysis
- Key Analysis
- Investigative process

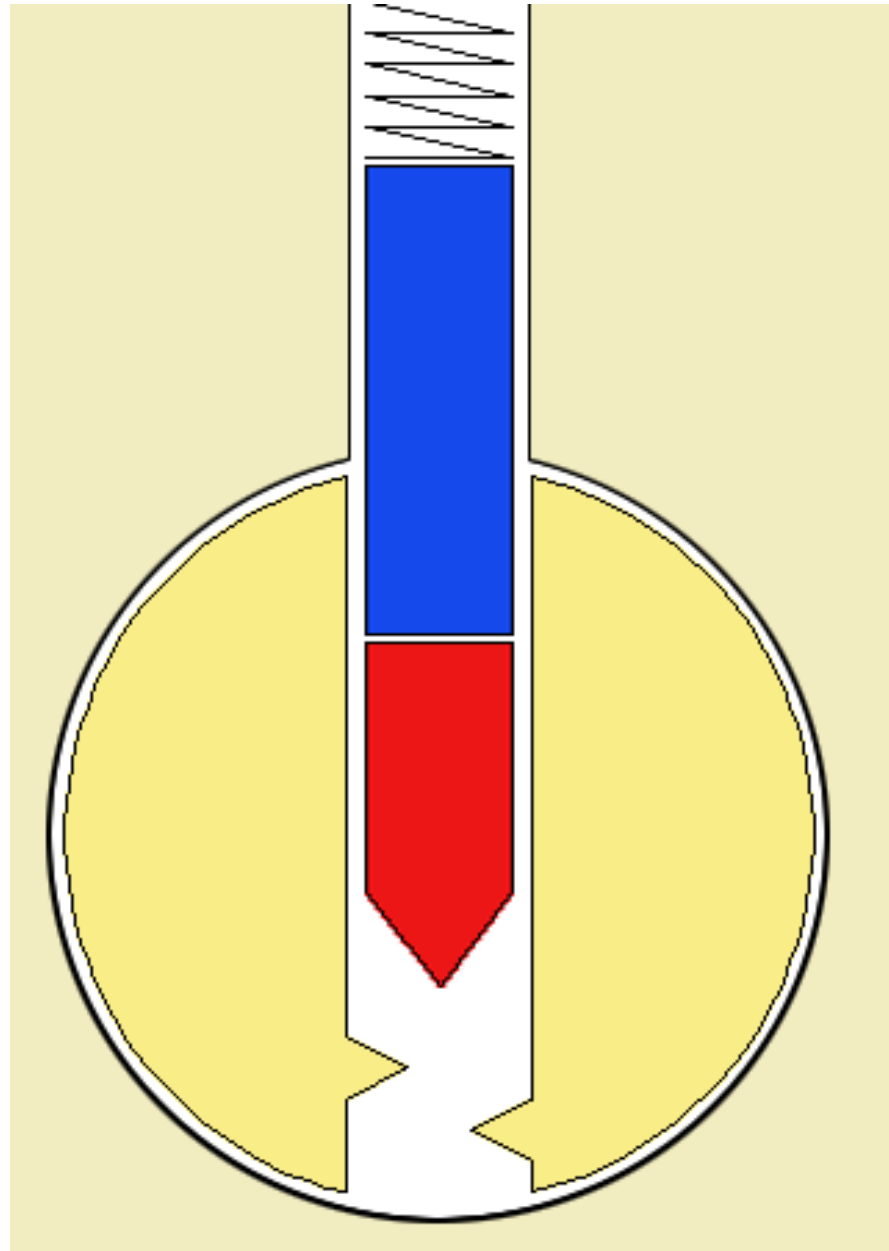
# Destructive entry still #1!



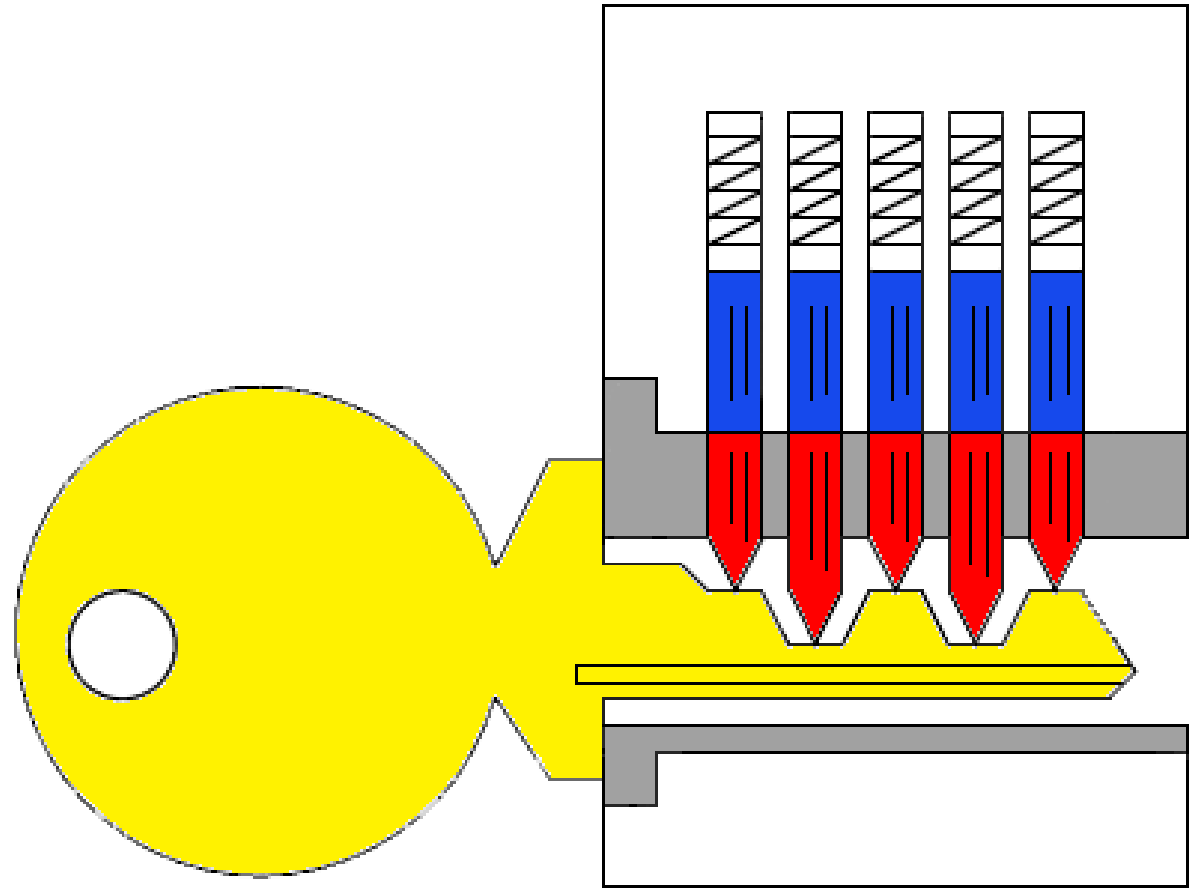
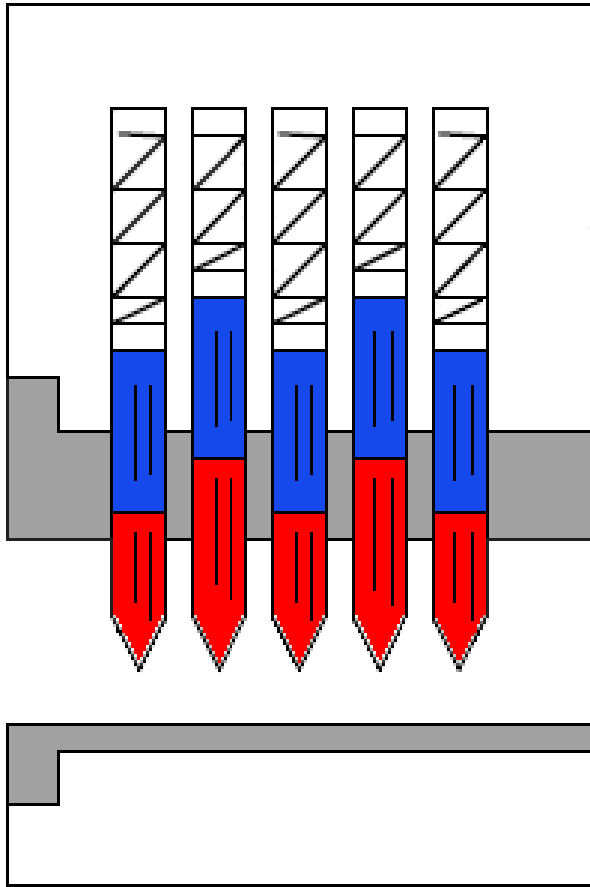
# How Locks Work



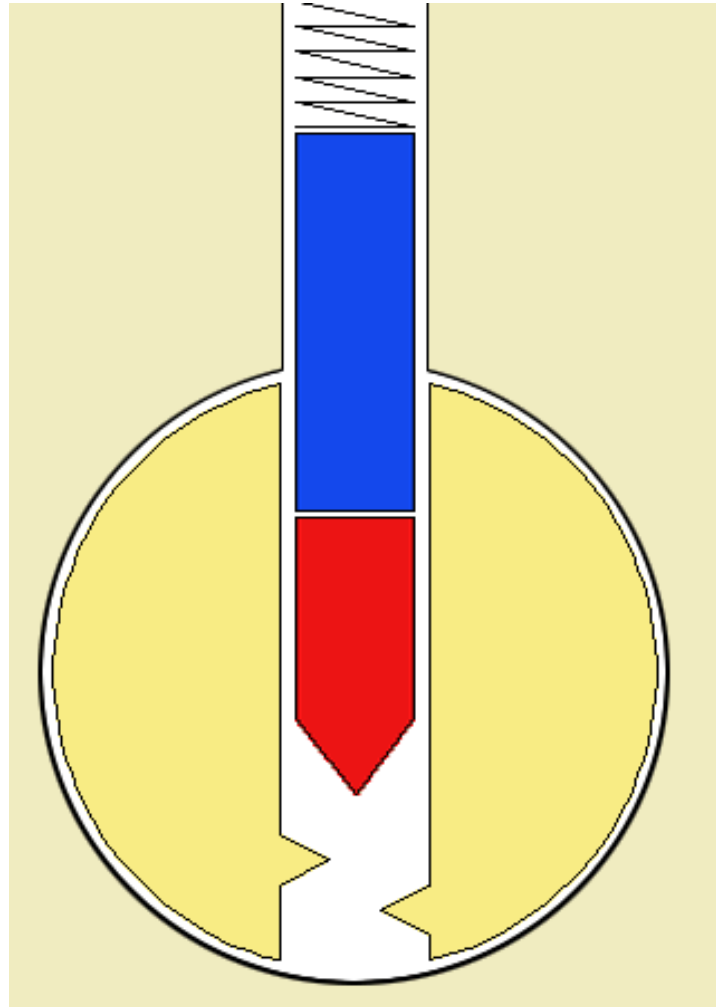
# How Locks Work



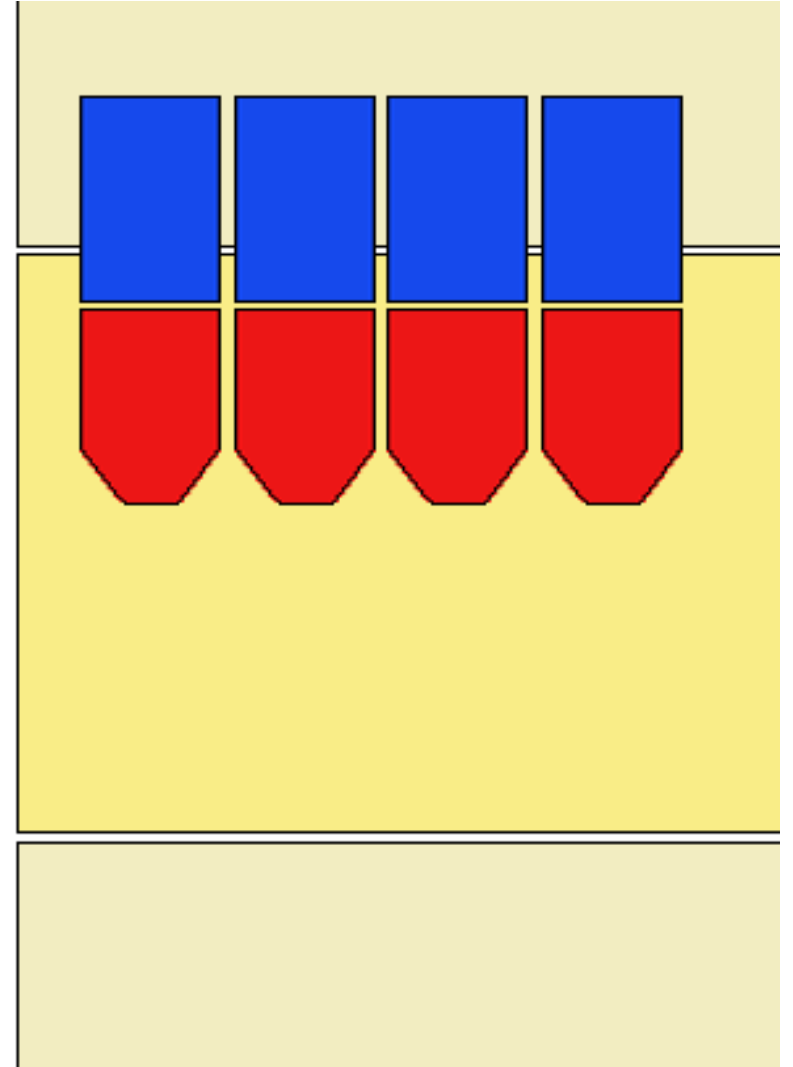
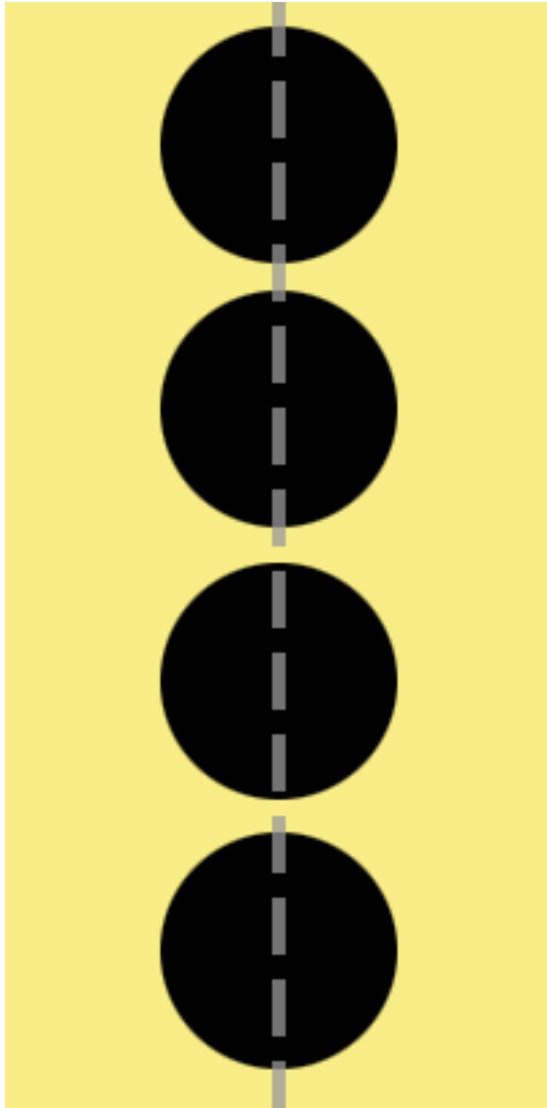
# How Locks Work



# How Locks Work

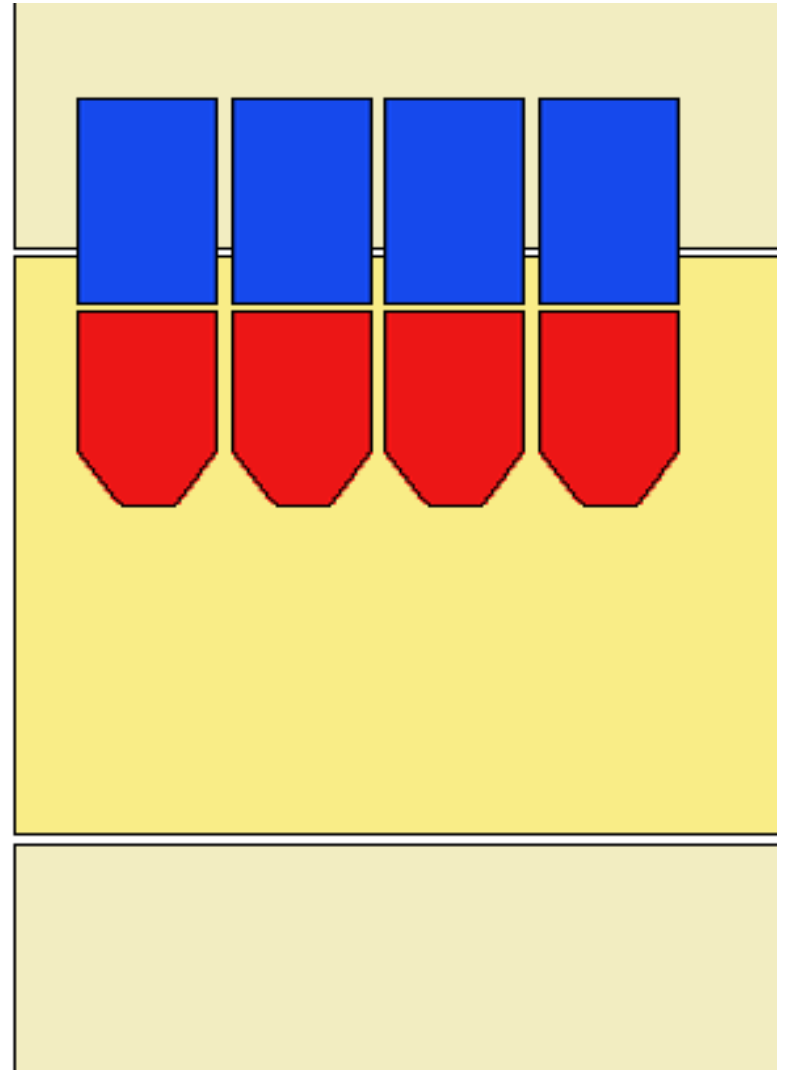
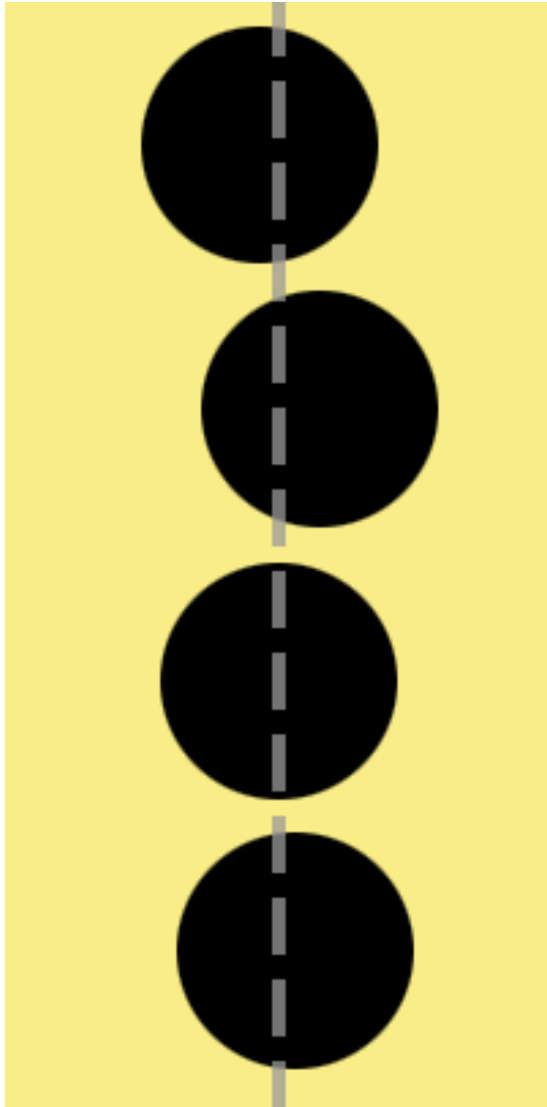


# Pin Binding





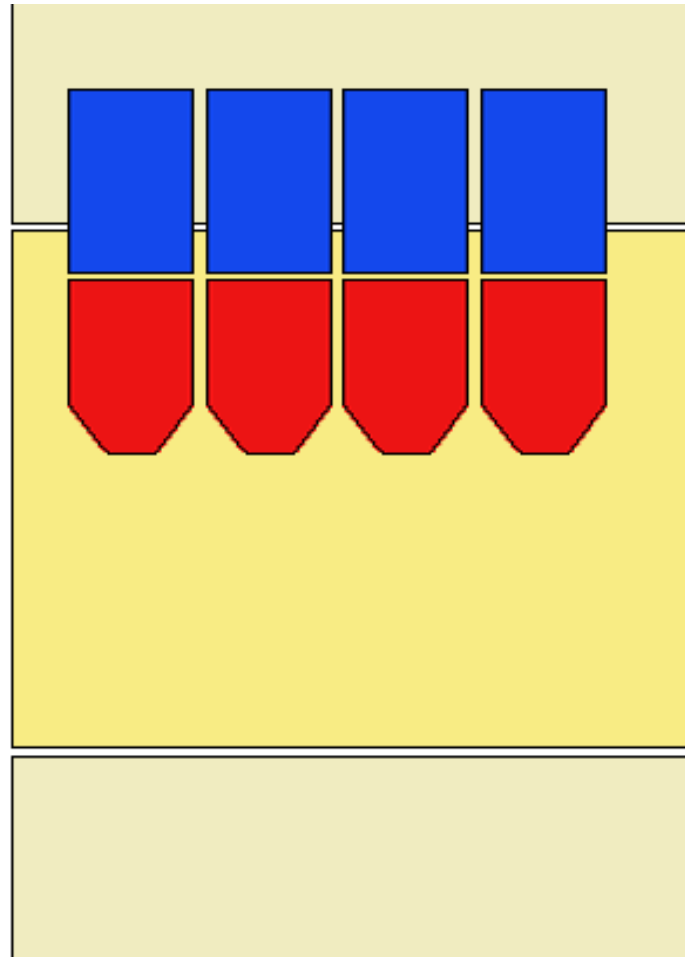
# Pin Binding



# Picking a Lock

- Apply tension
- Find binding pin
- Raise to shear line
- Repeat

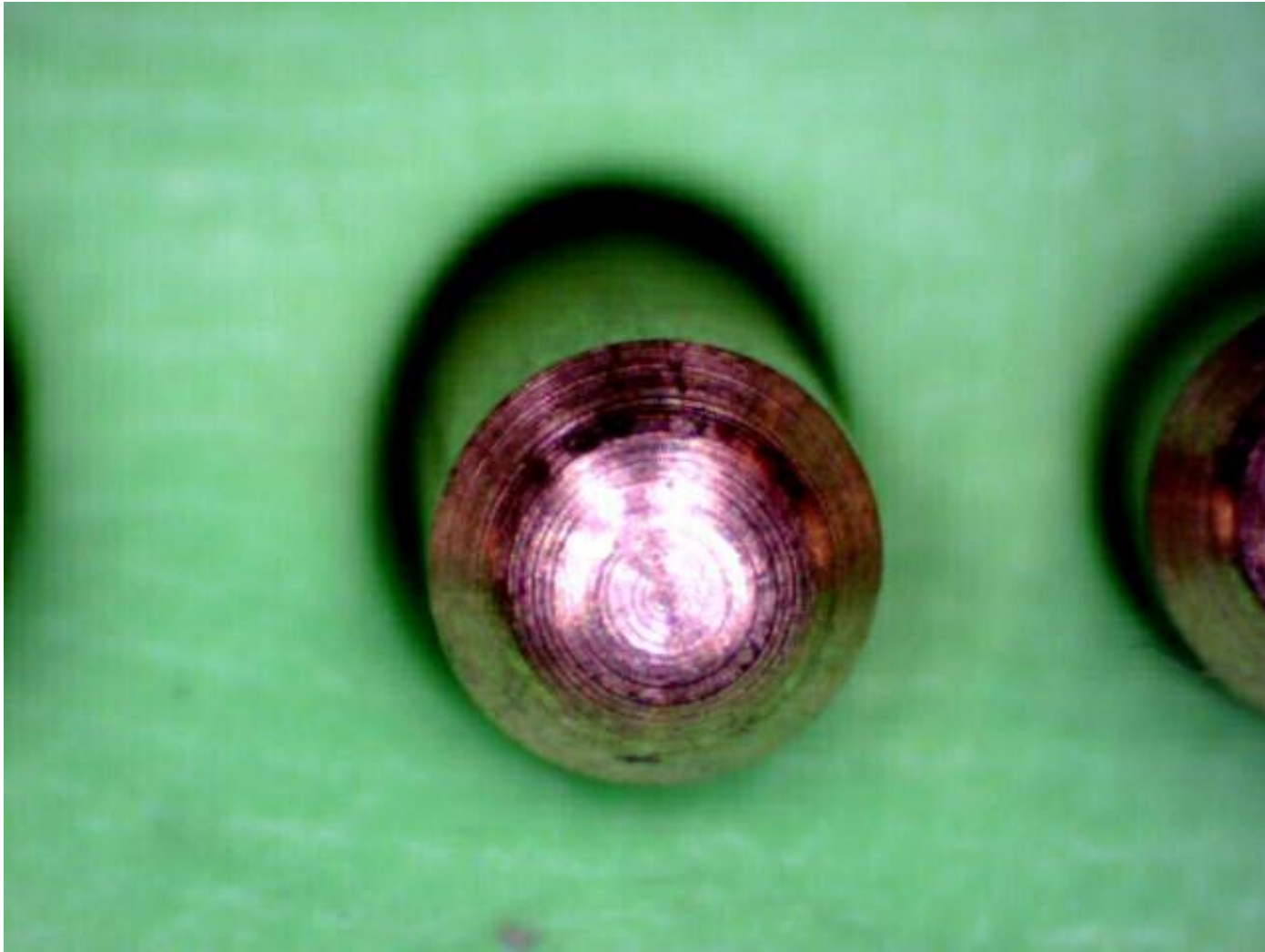
# Picking a Lock



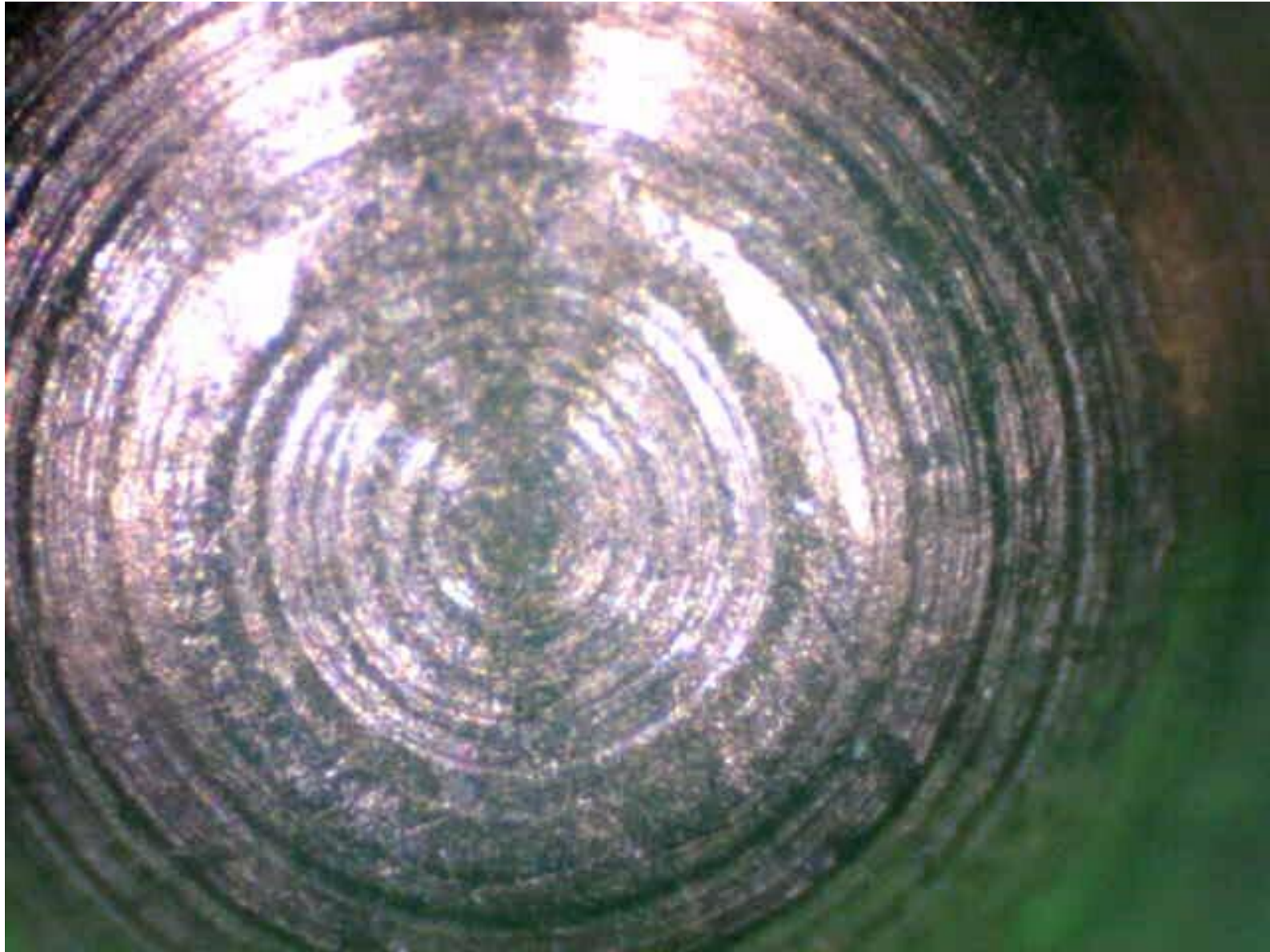
# Forensic Locksmithing

- 1976 - Art Paholke, Chicago PD
- Locks, Safes, Security (Tobias)
- Werkzeugspur (Goth)
- Impressioning (Diederichsen)
- Determine method of entry
- Identify evidence, tool marks, techniques
- Provide expert testimony

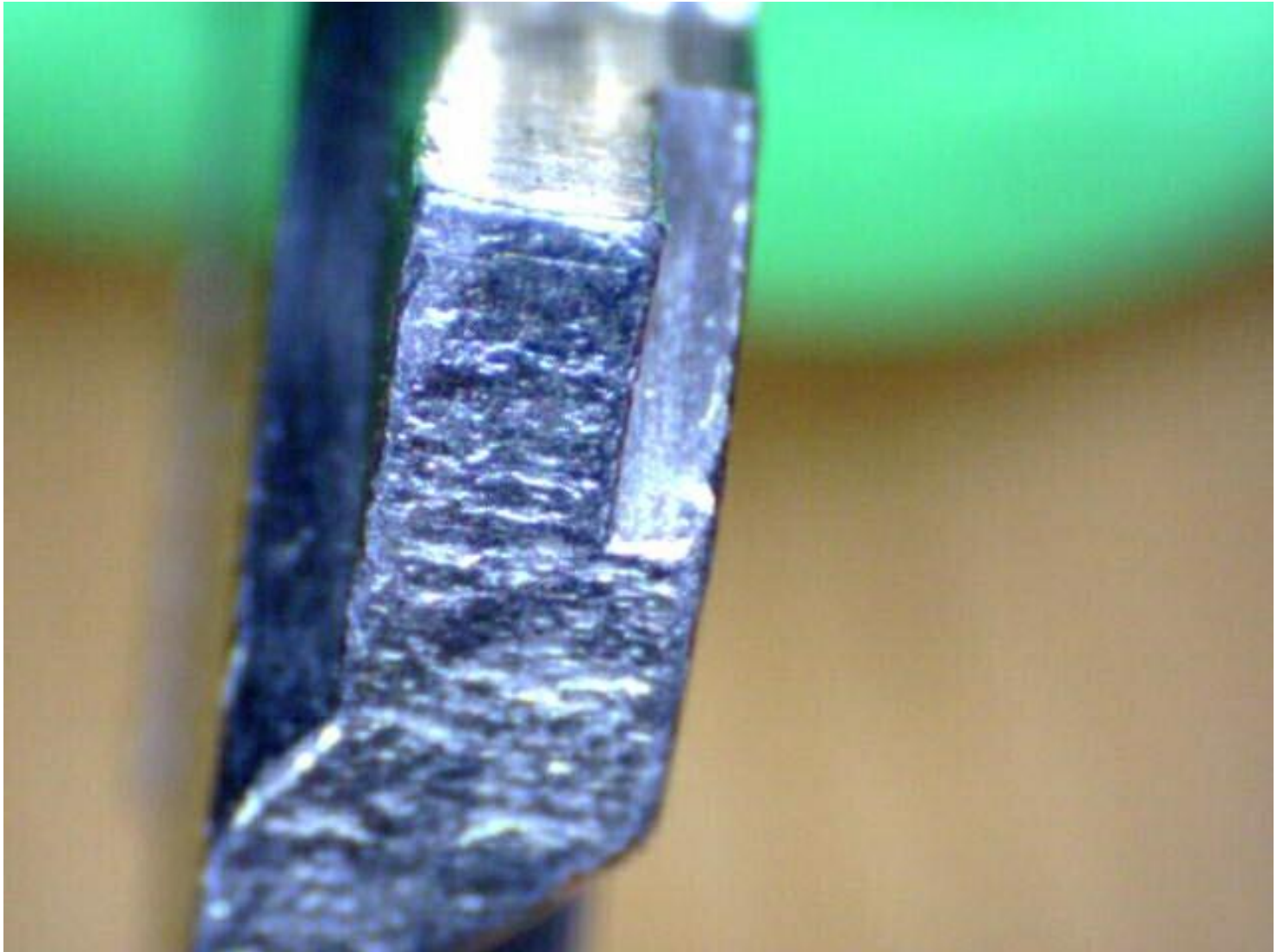
# Pins - New



# Pins - New



# Key - New





# Plug - New





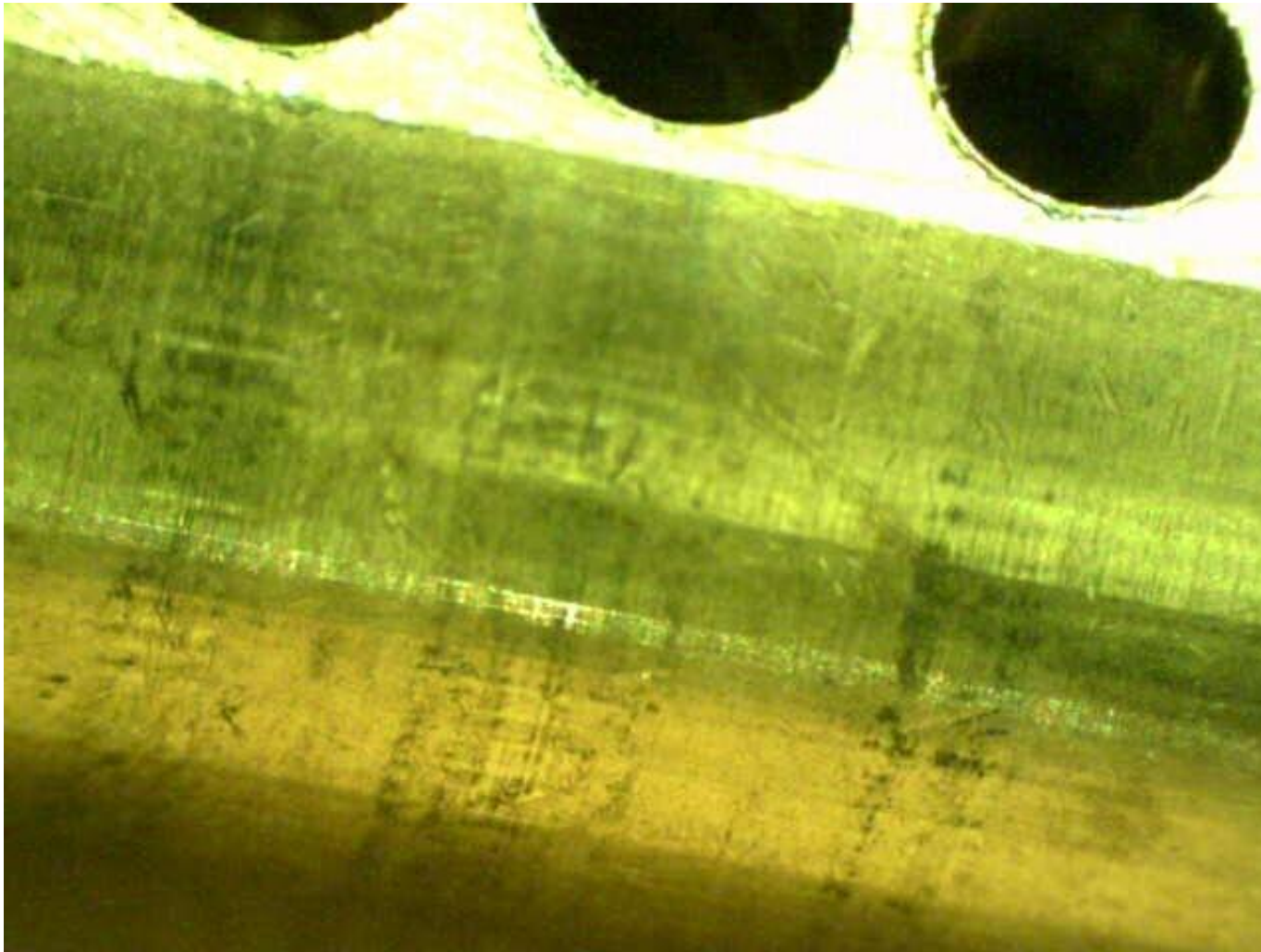
# Pins - 100 uses



# Pins - 100 uses

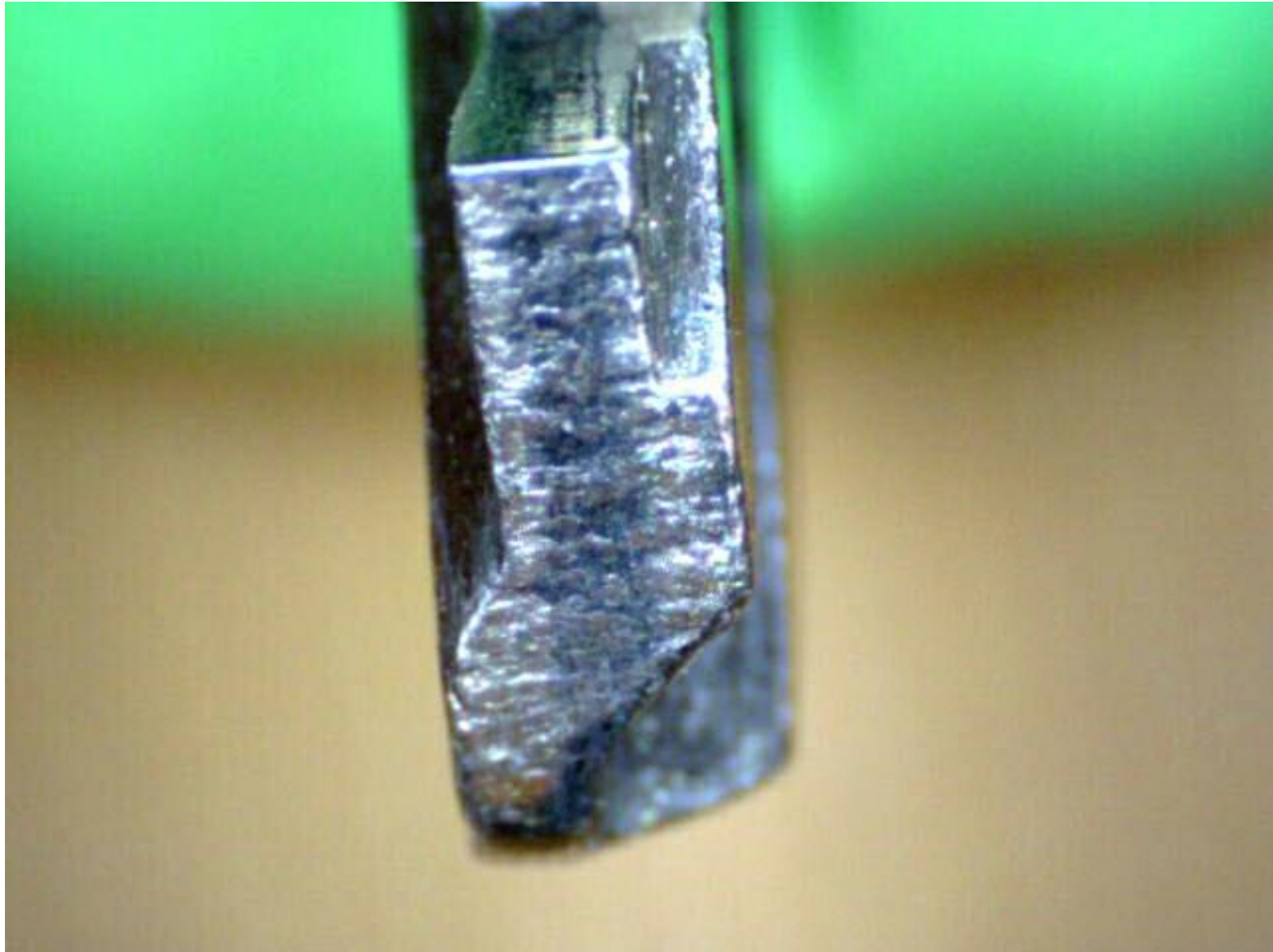


# Plug - 100 uses

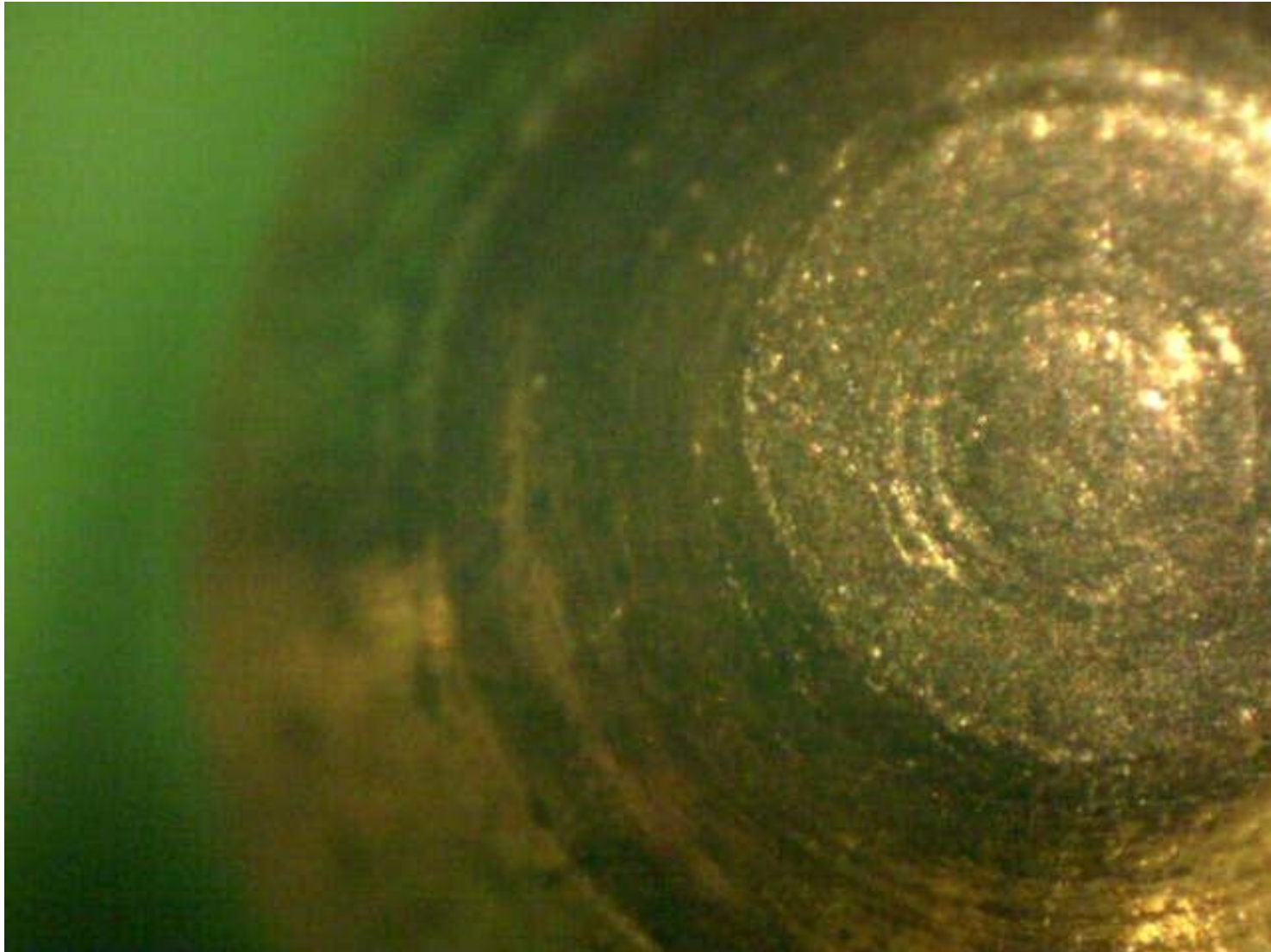




# Key - 100 Uses



Pins - 1,500 uses (pin 1)

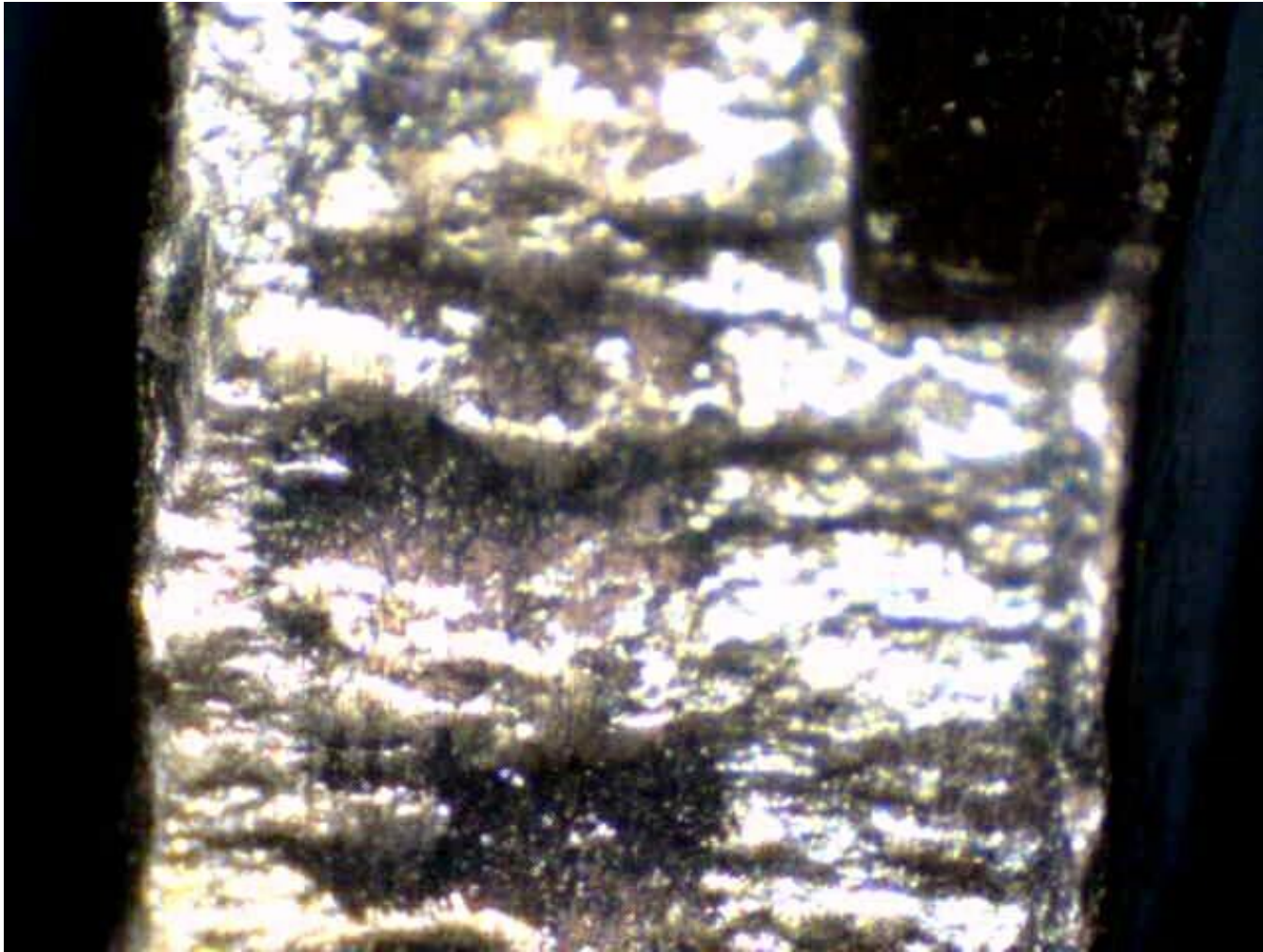


Pins - 1,500 uses (pin 5)

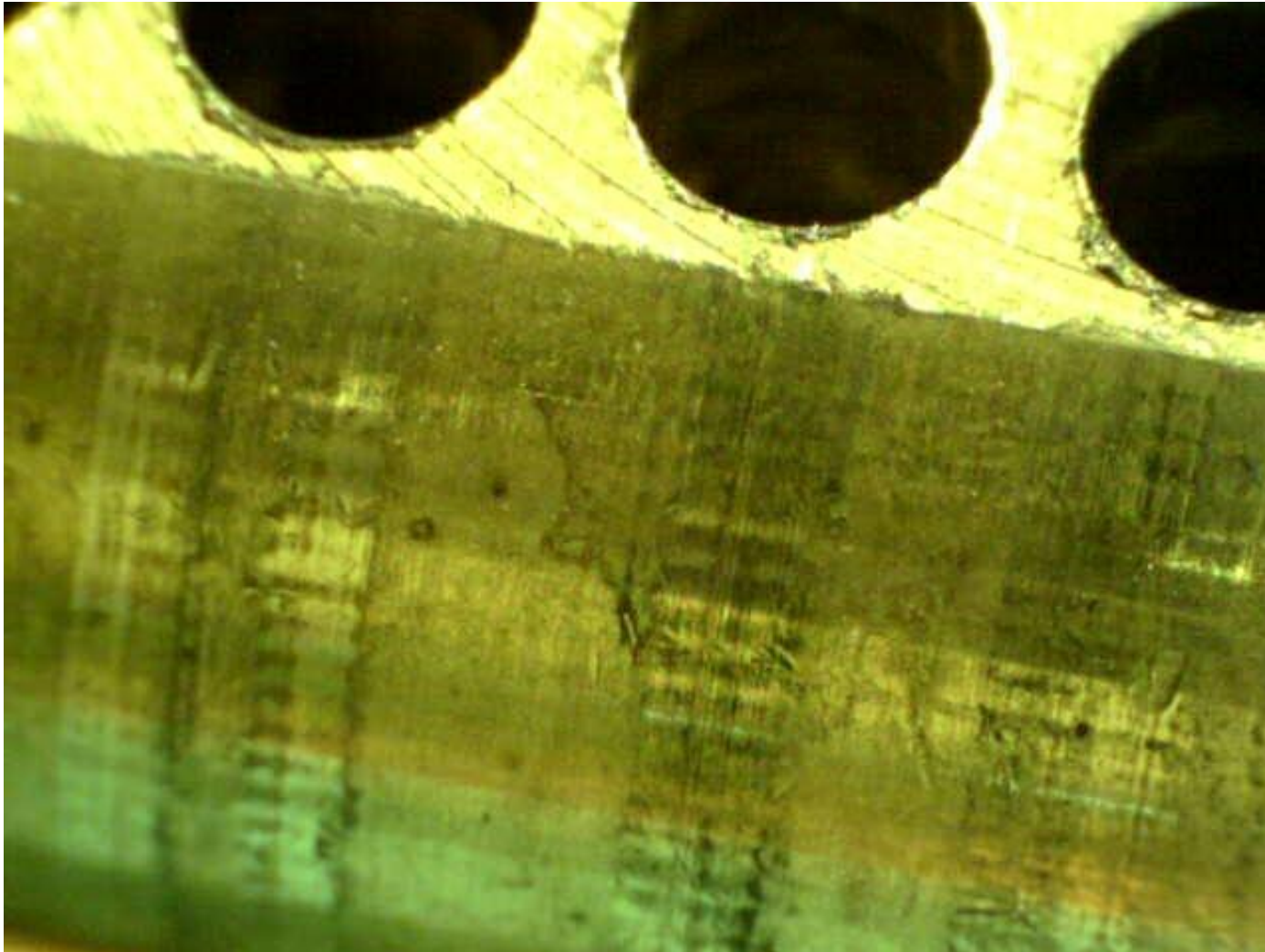




Key - 1,500 uses

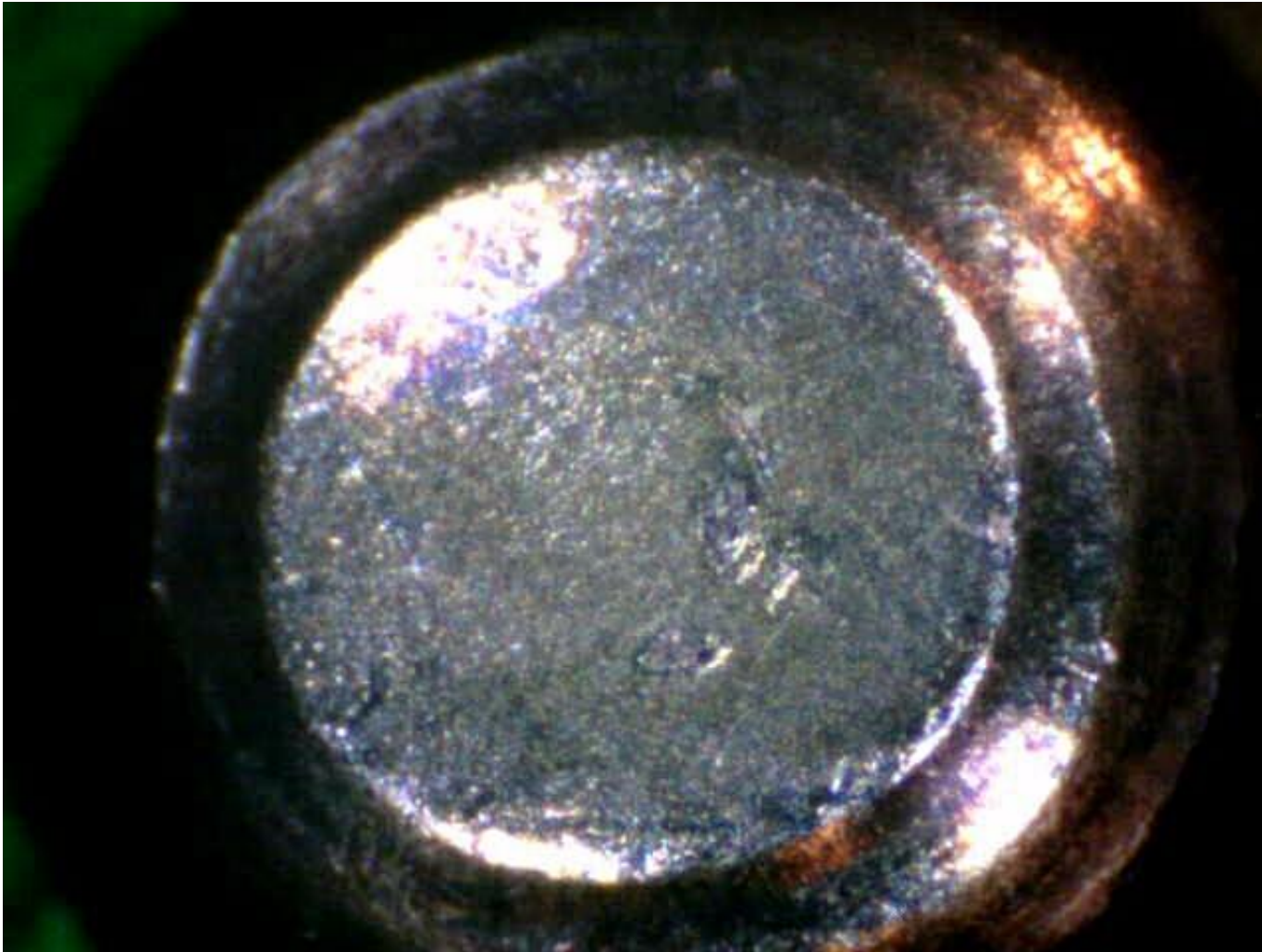


Plug - 1,500 uses





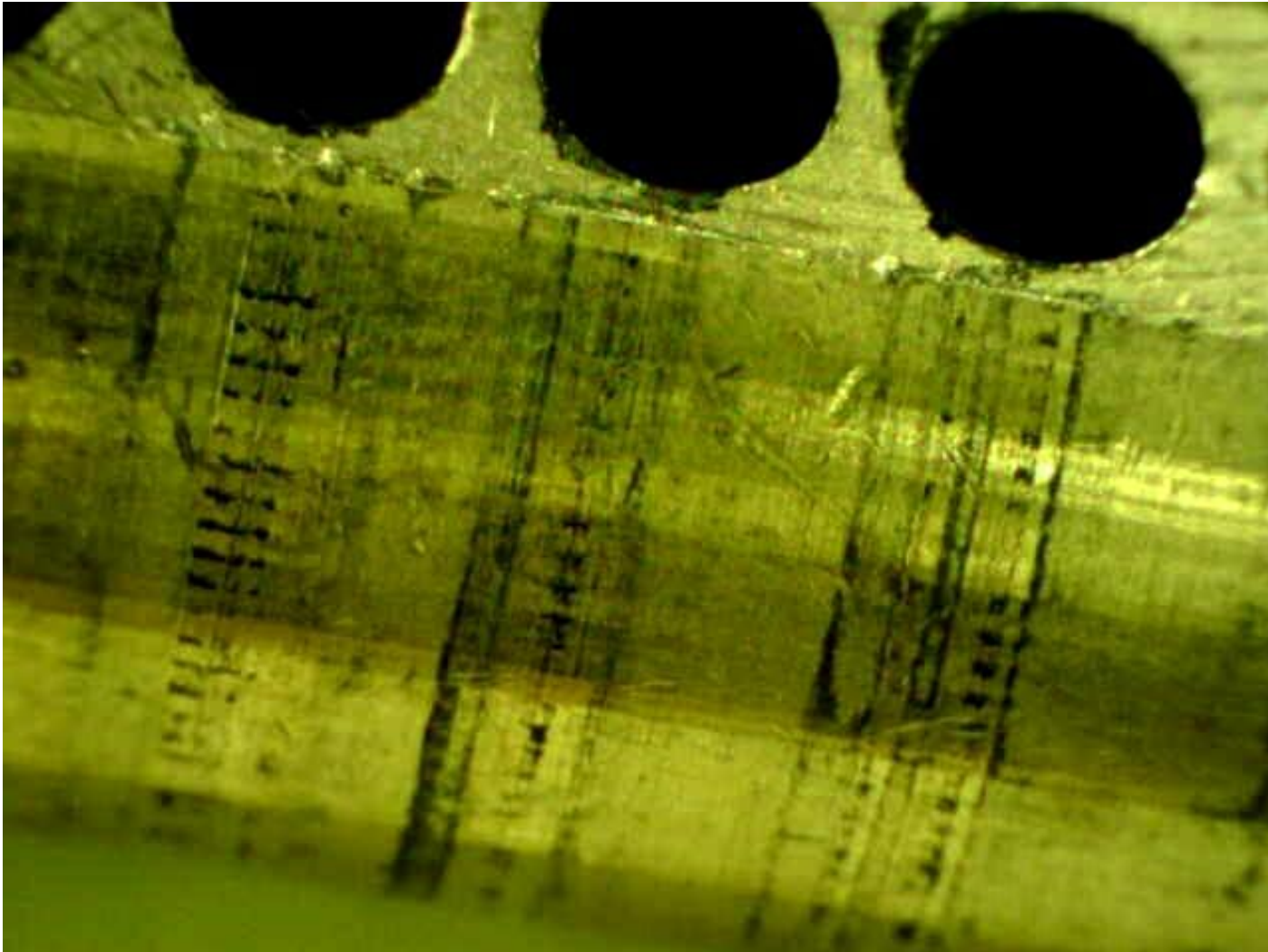
Pins - 5,000 uses (pin 1)



Pins - 5,000 uses (pin 5)

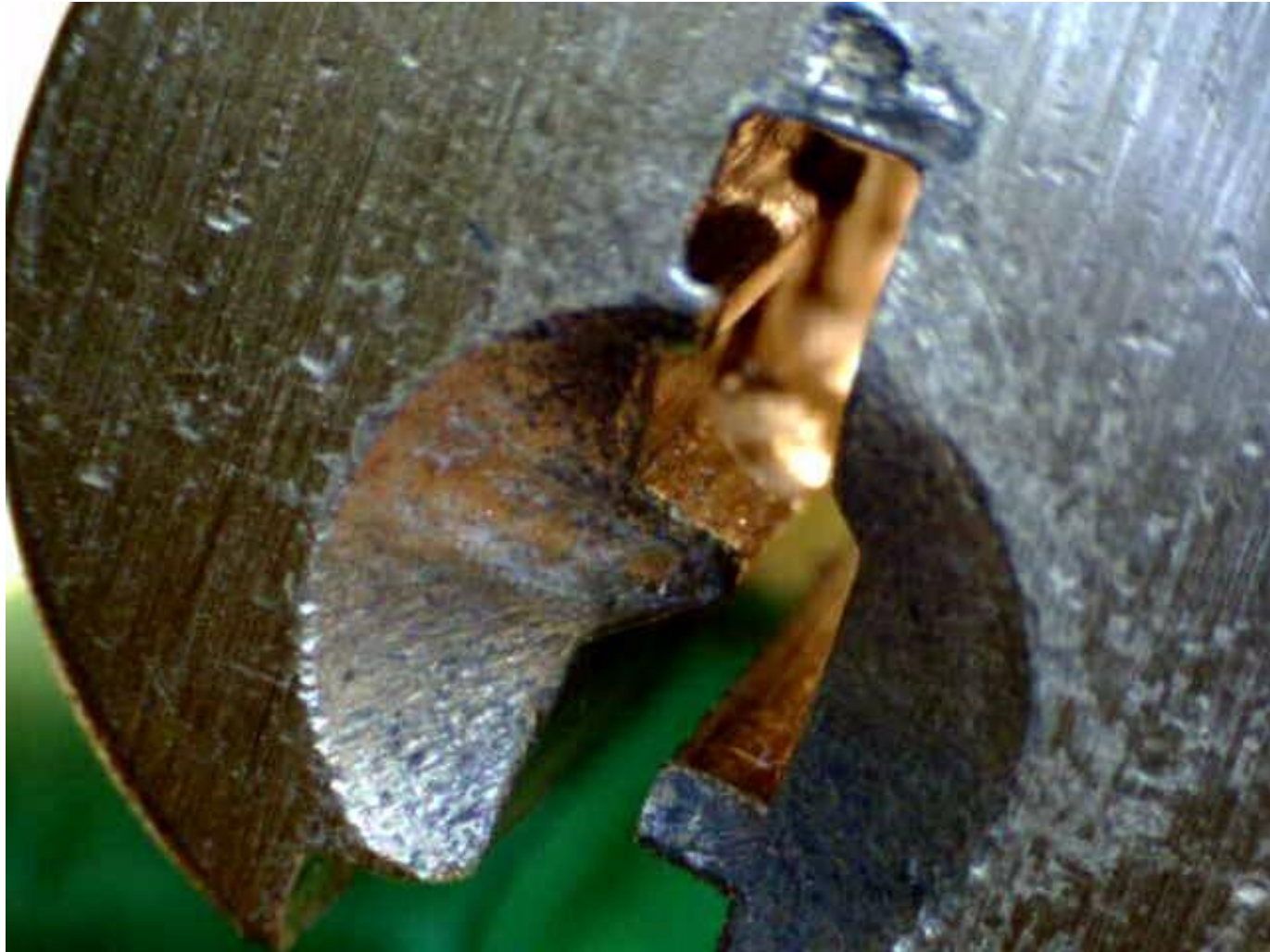


# Plug - 5,000 uses





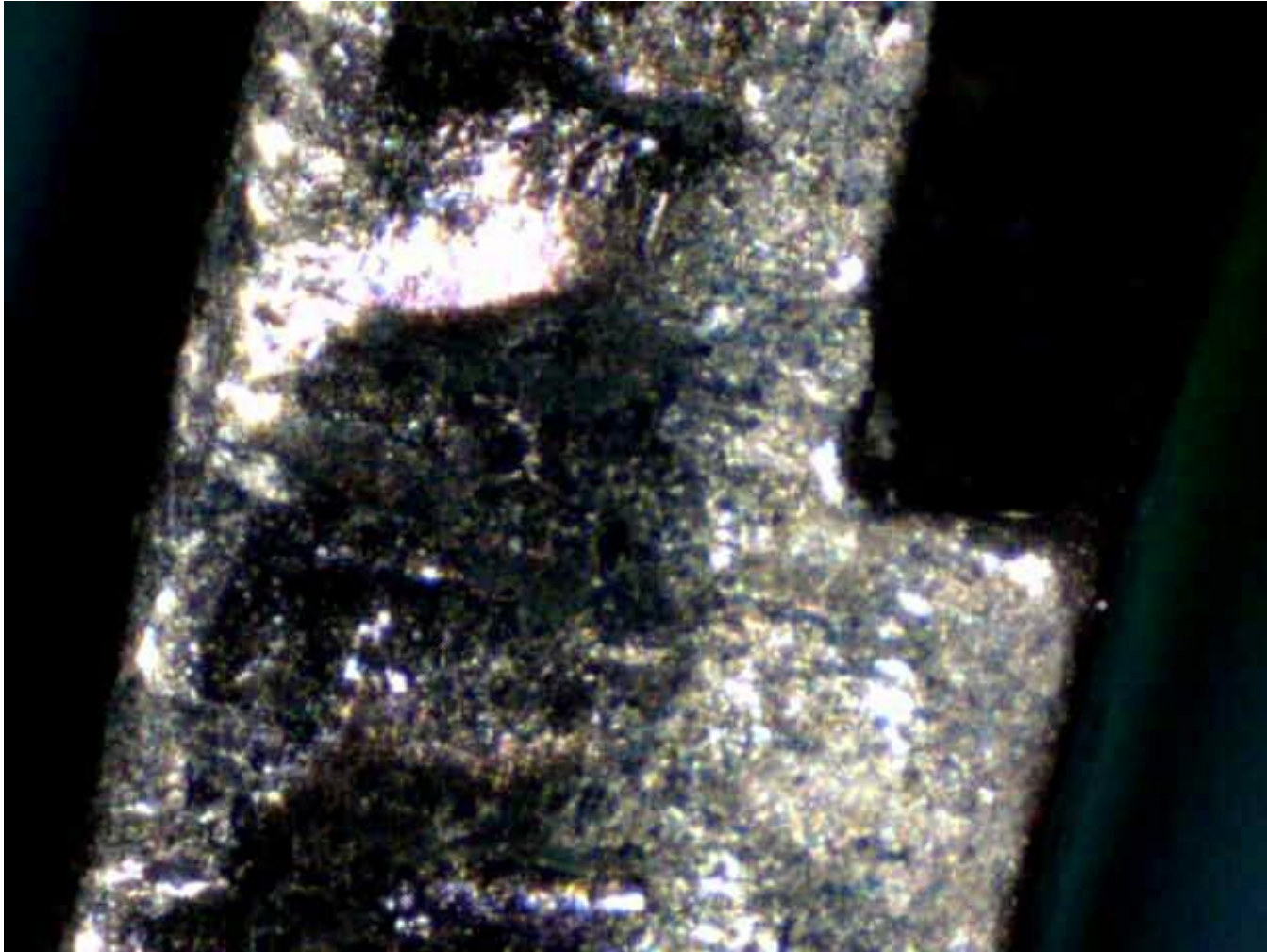
Plug - 5,000 uses



Plug - 5,000 uses



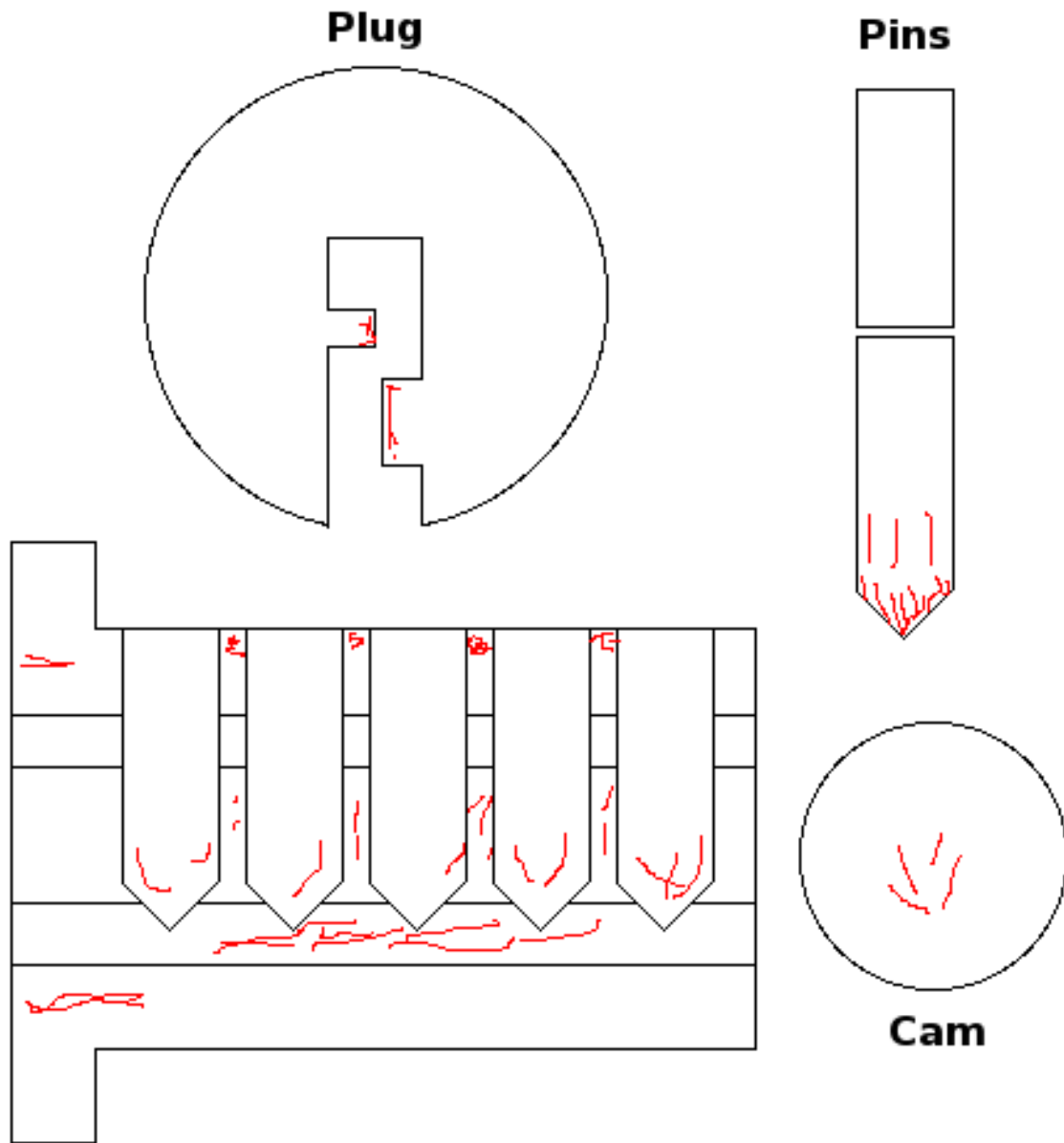
Key - 5,000 uses



# Forensic Analysis

- Components (pins, springs, etc)
- Plug
- Cylinder
- Cam/Actuator
- Keys
- Bolt
- Door, window, wall, etc

# Lockpicking

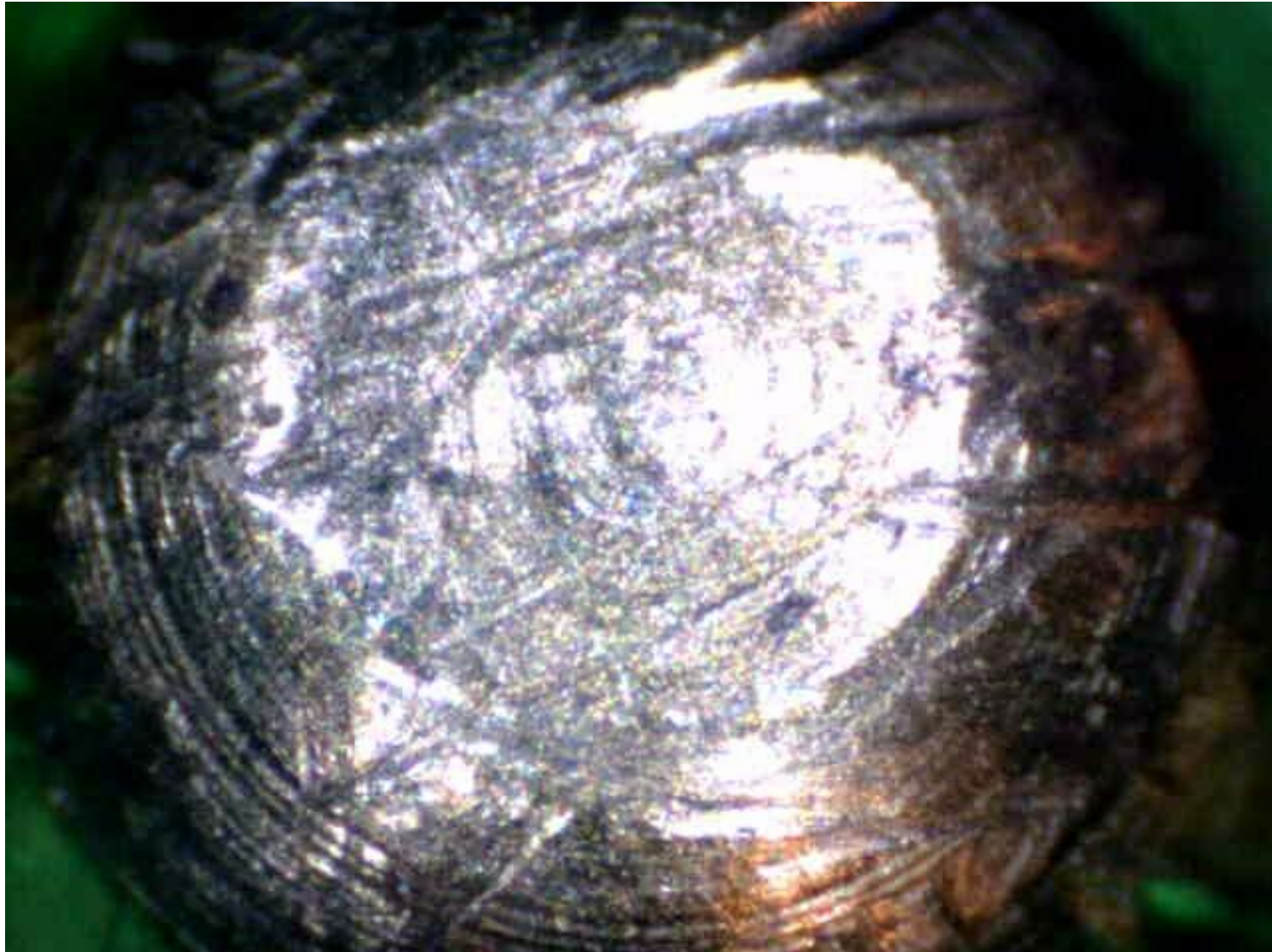




# Lockpicking - Pins

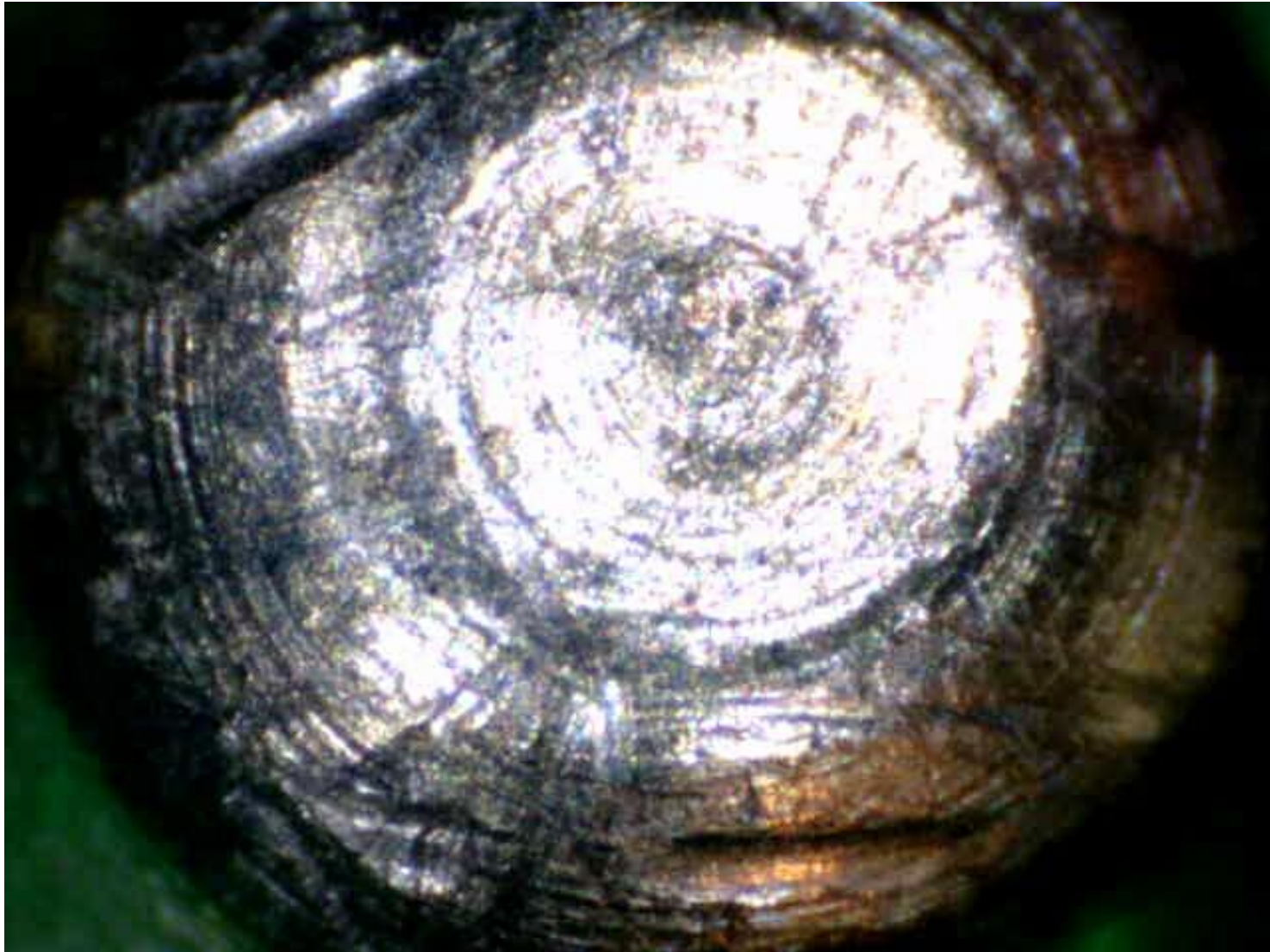


# Lockpicking - Pins





# Lockpicking - Pins



# Lockpicking - Pins





# Lockpicking - Pins



# Lockpicking - Pins





# Lockpicking - Pins

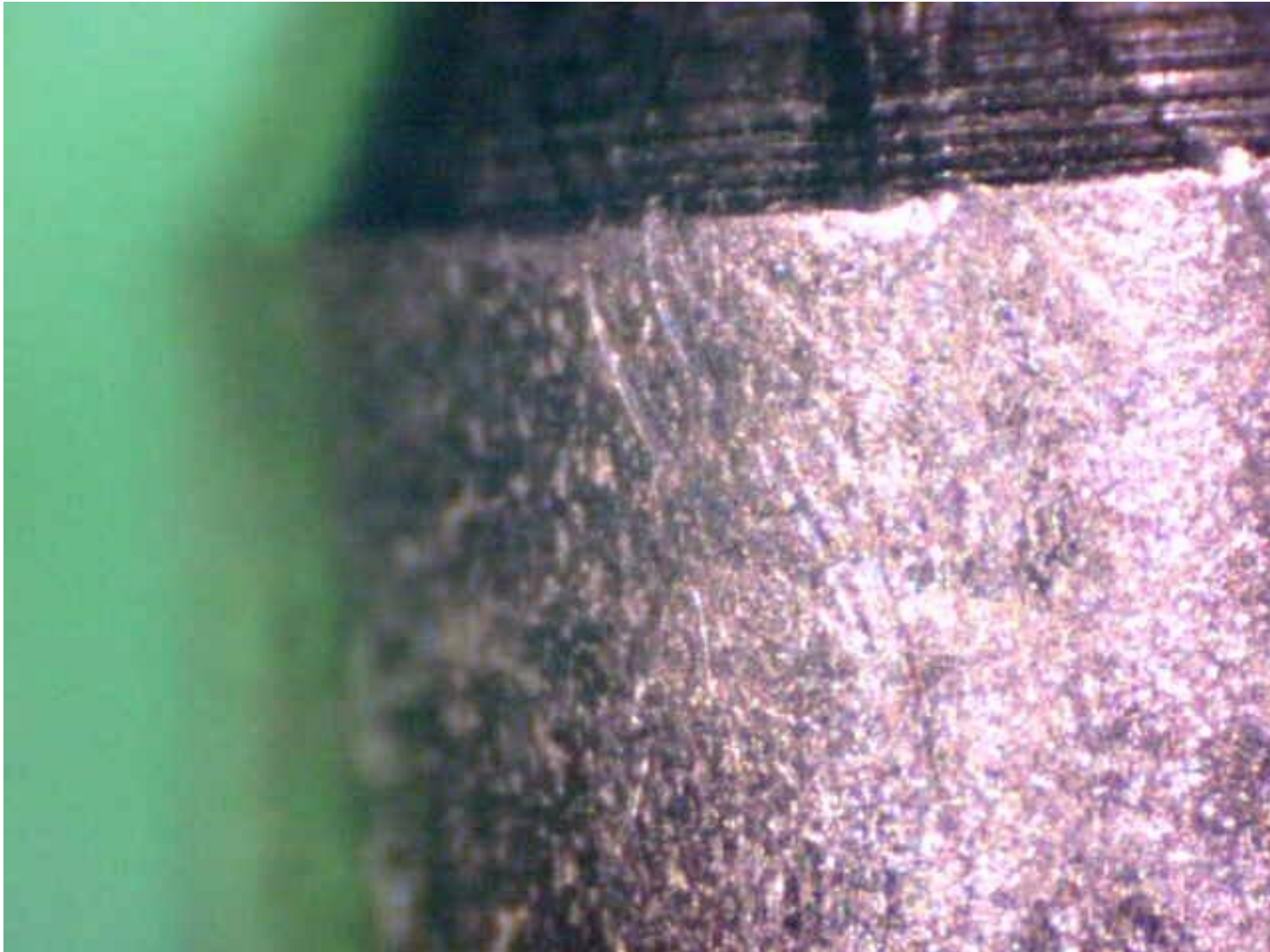


# Lockpicking - Pins





# Lockpicking - Pins

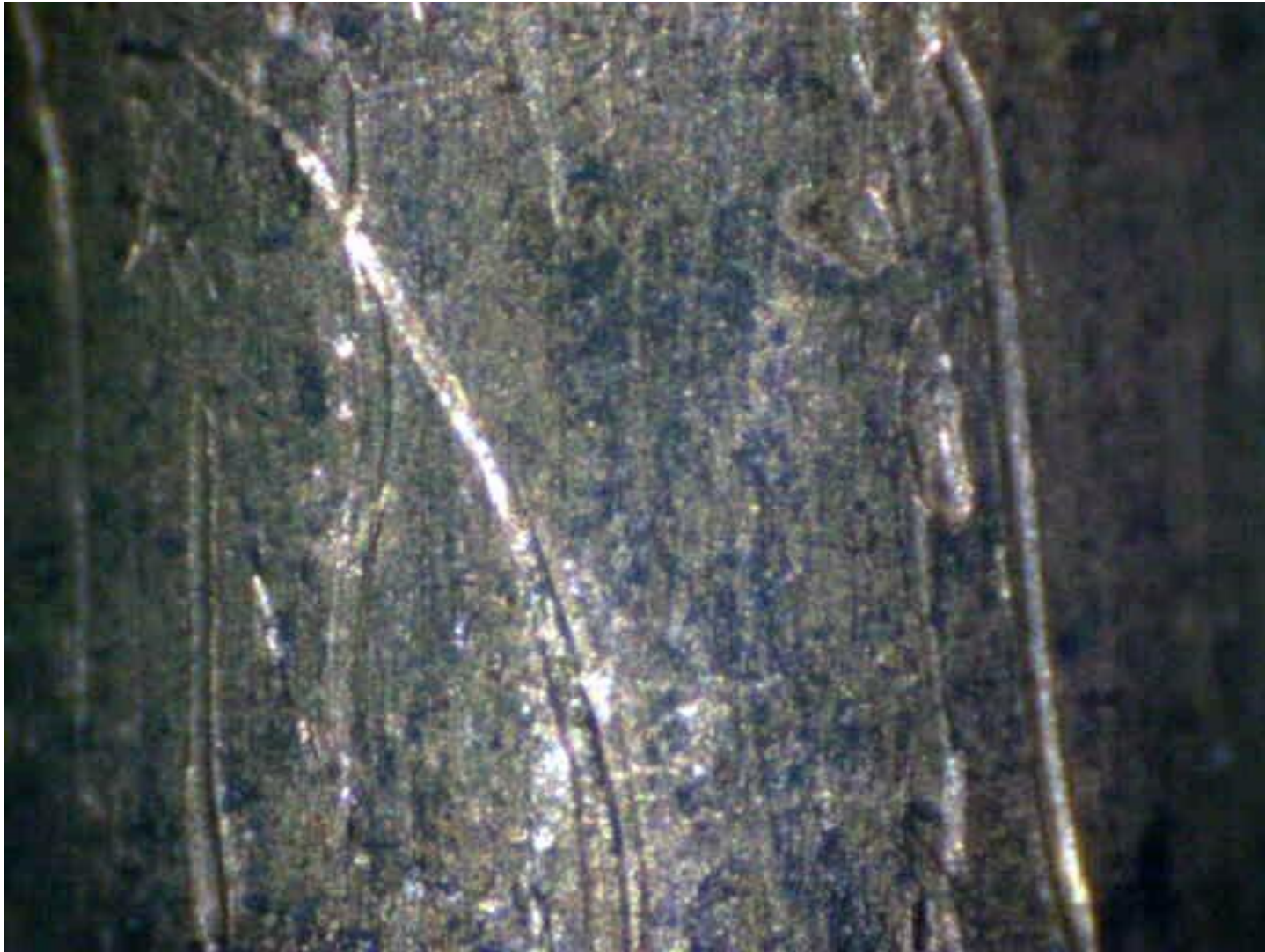


# Lockpicking - Pins

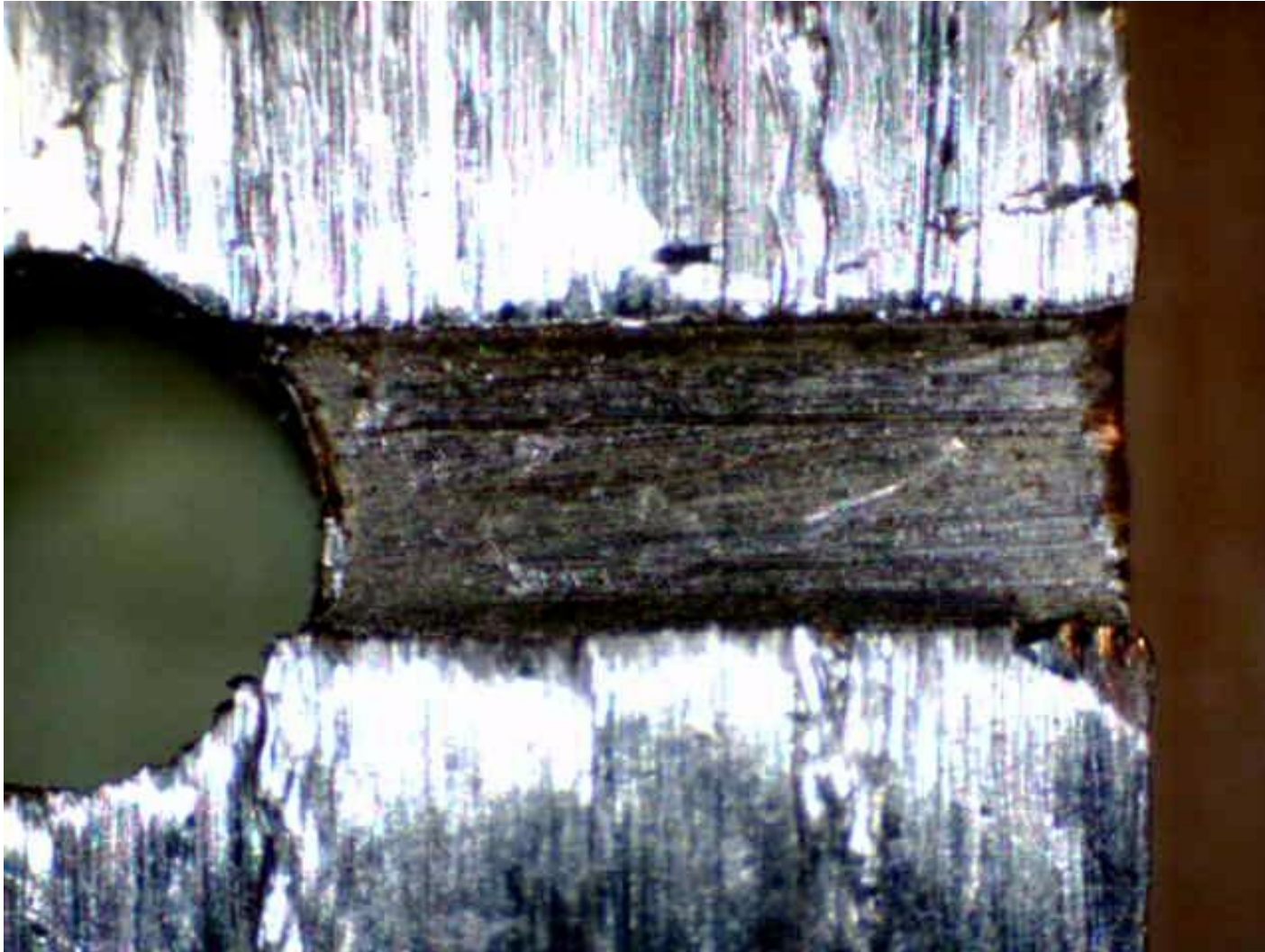




# Lockpicking - Pins

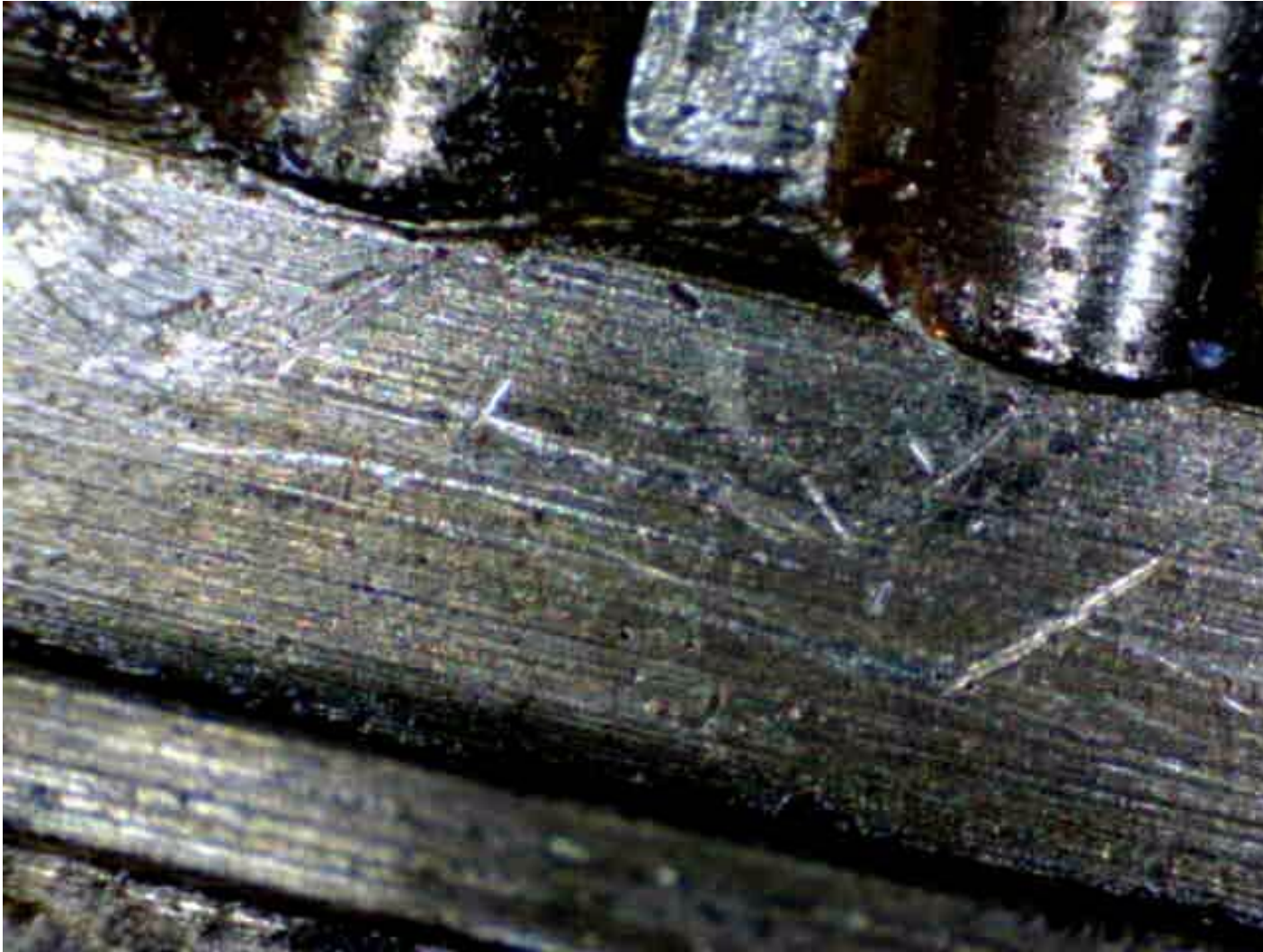


# Lockpicking - Plug



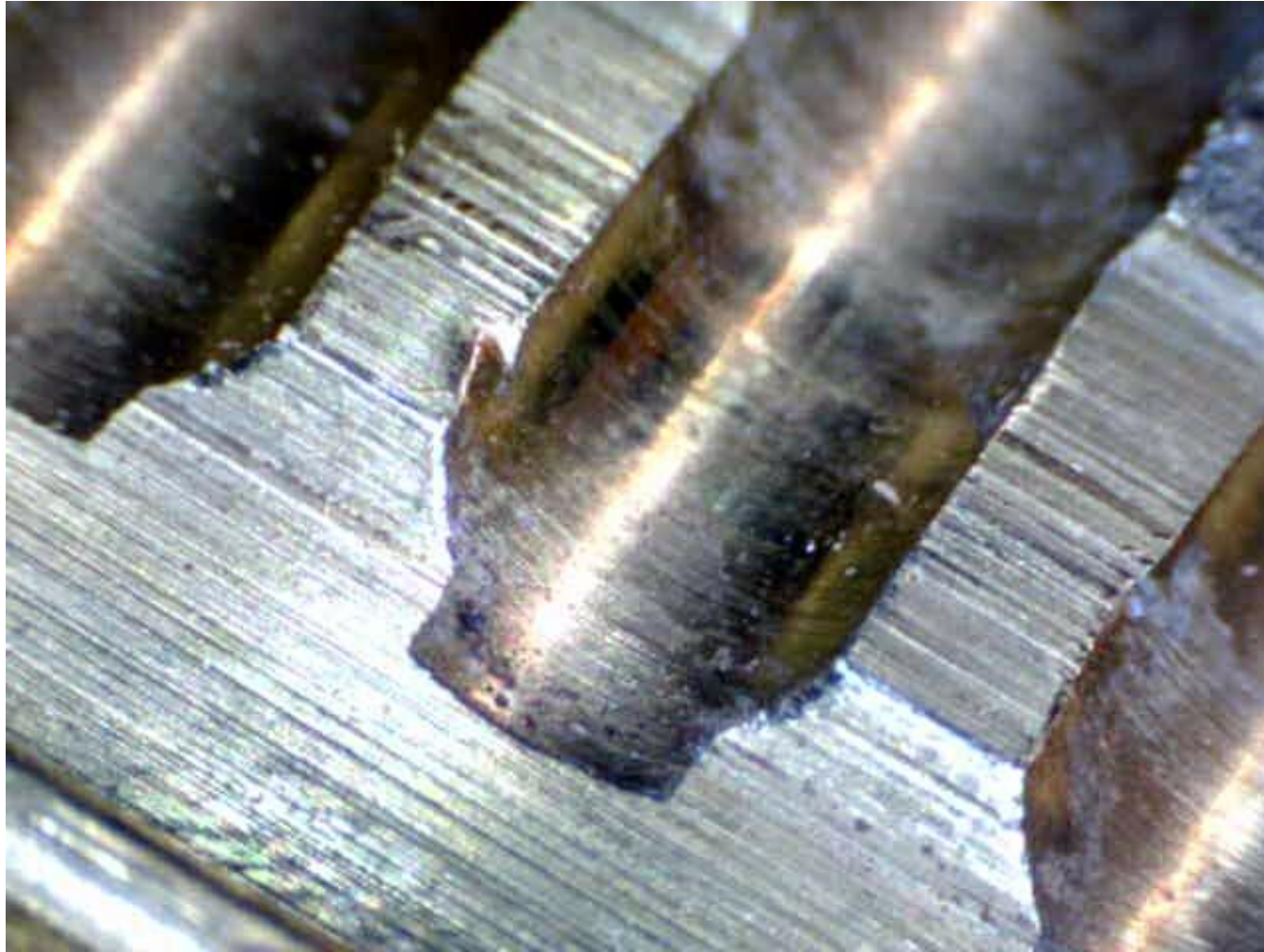


# Lockpicking - Plug

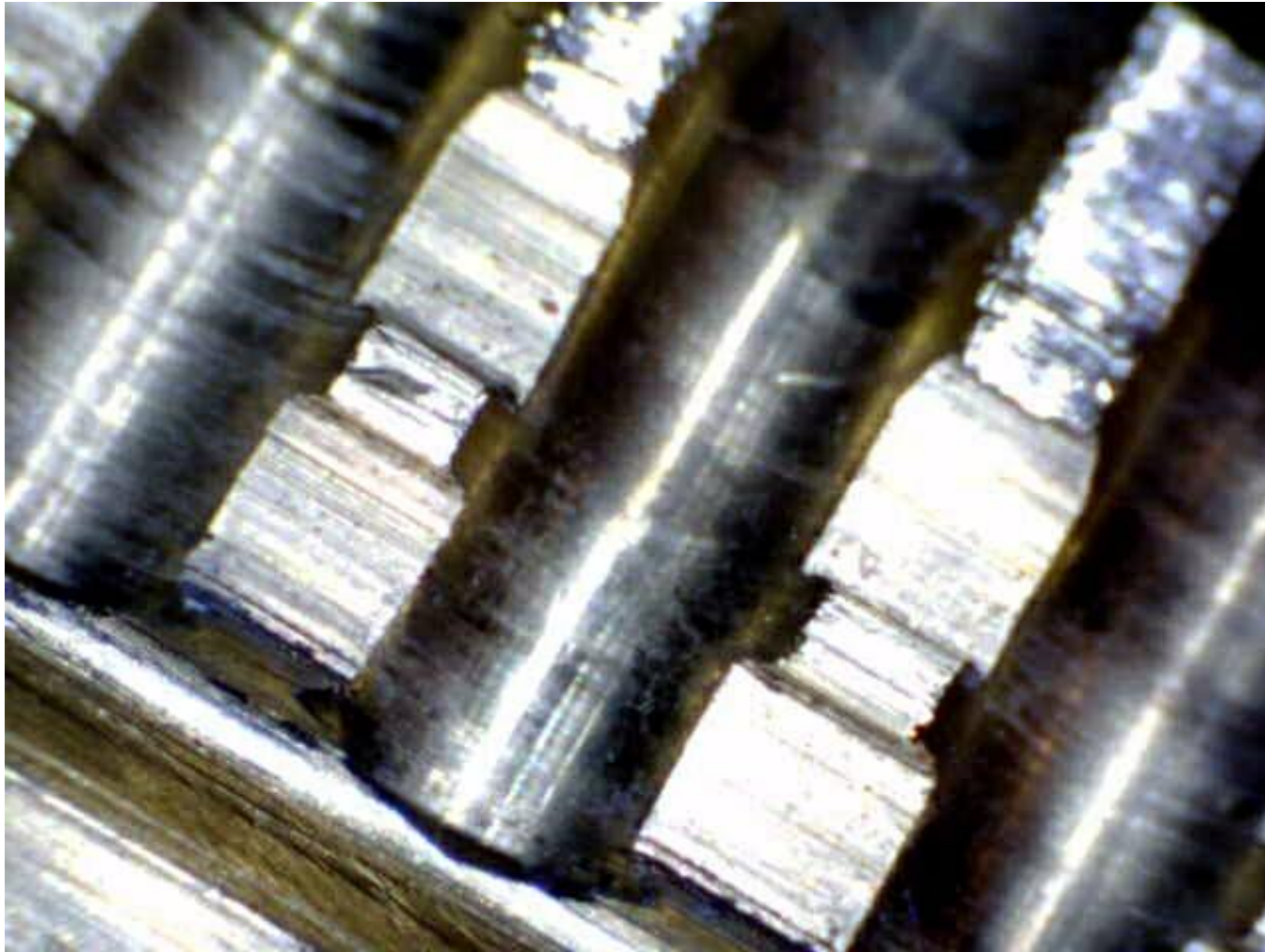




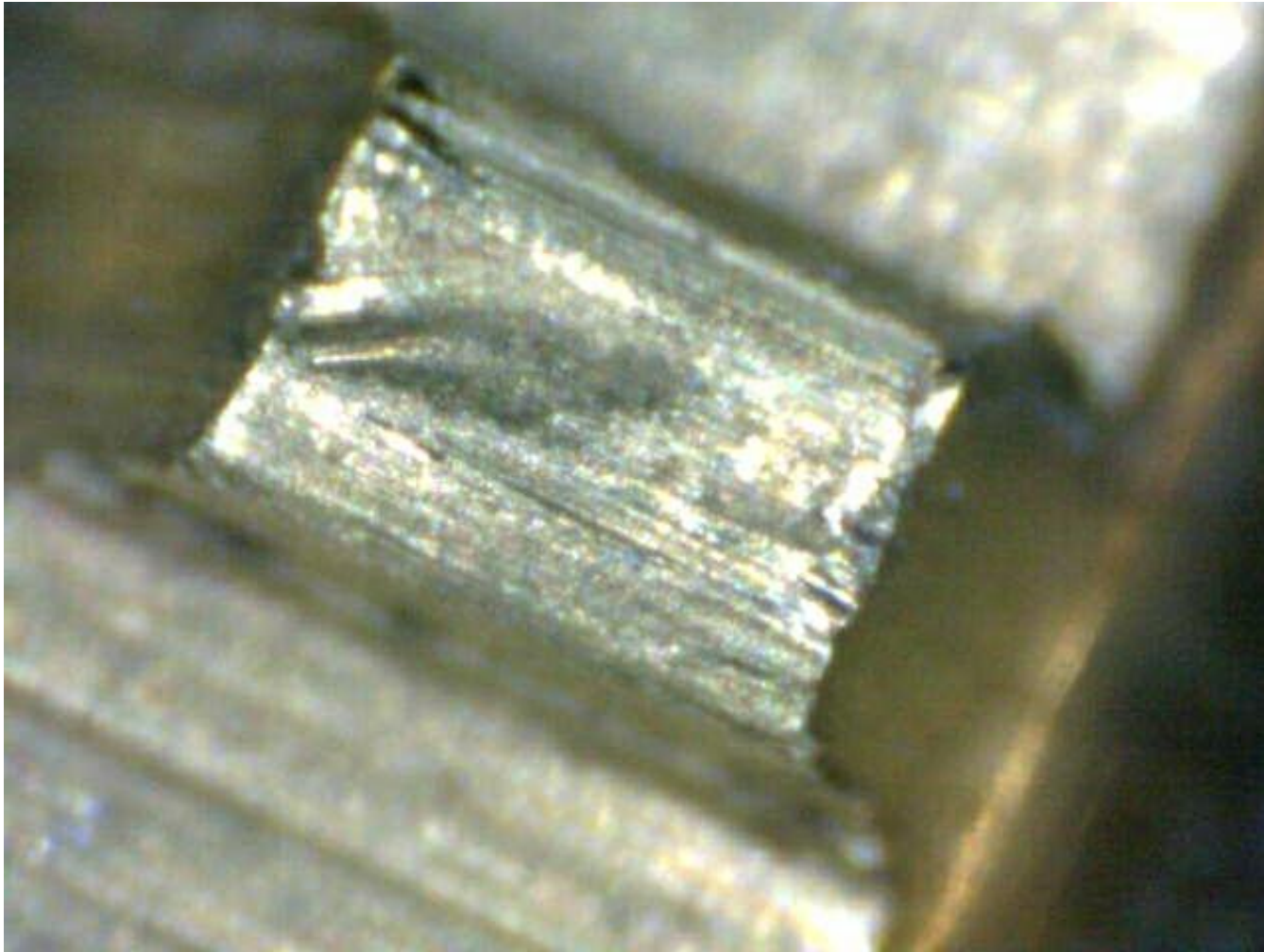
# Lockpicking - Plug



# Lockpicking - Plug



# Lockpicking - Plug



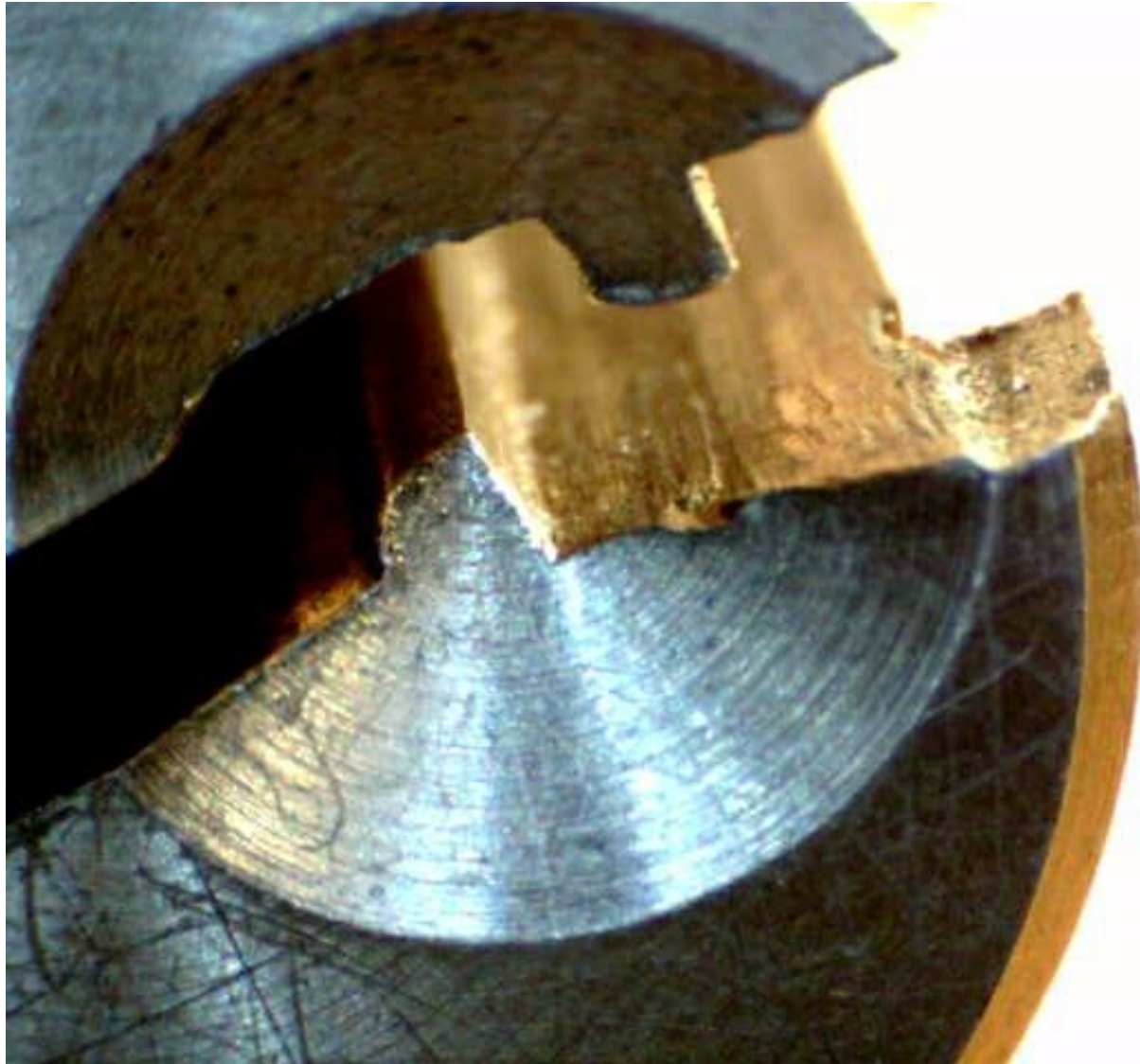


# Lockpicking - Plug

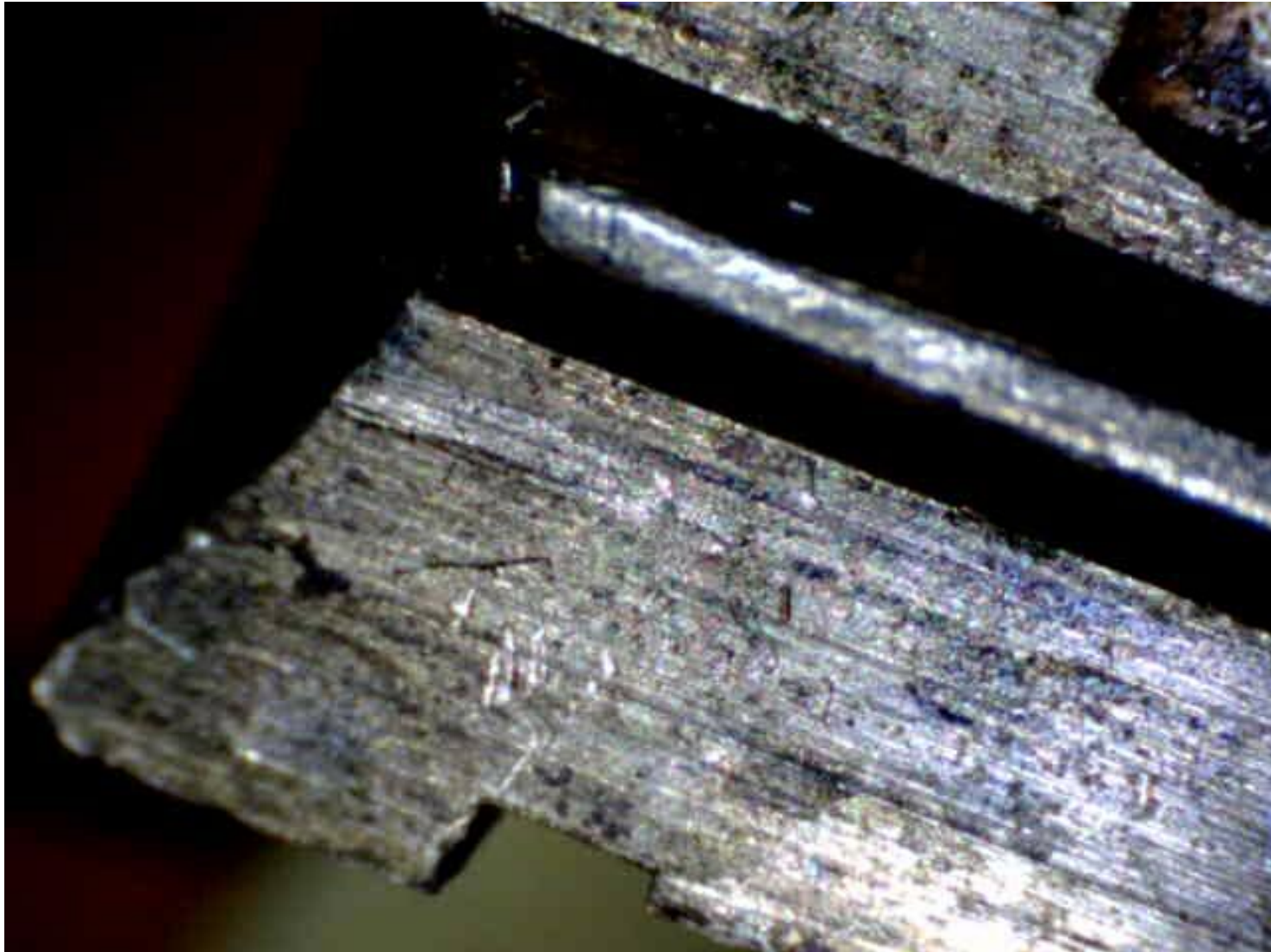




# Lockpicking - Tension

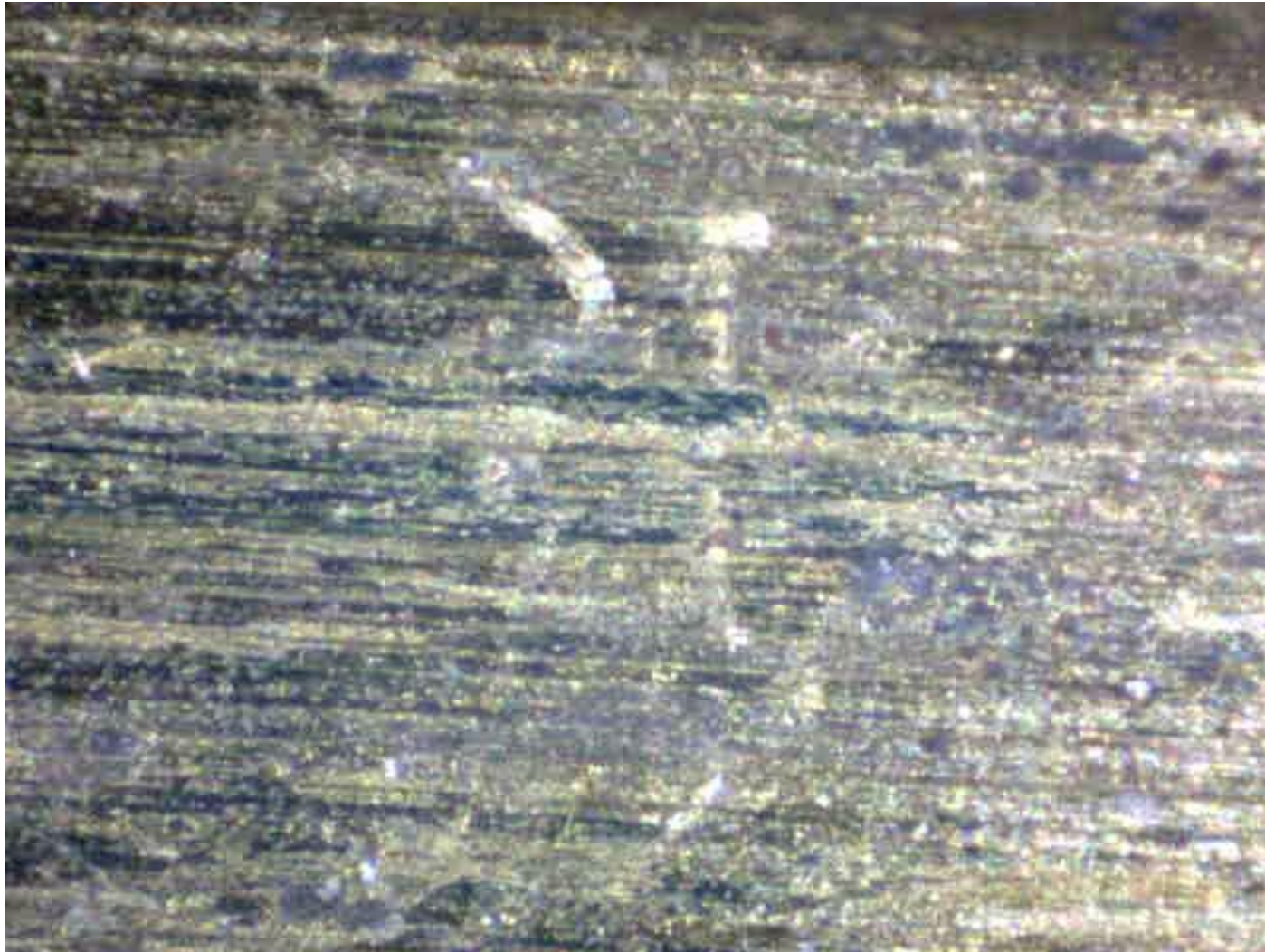


# Lockpicking - Tension

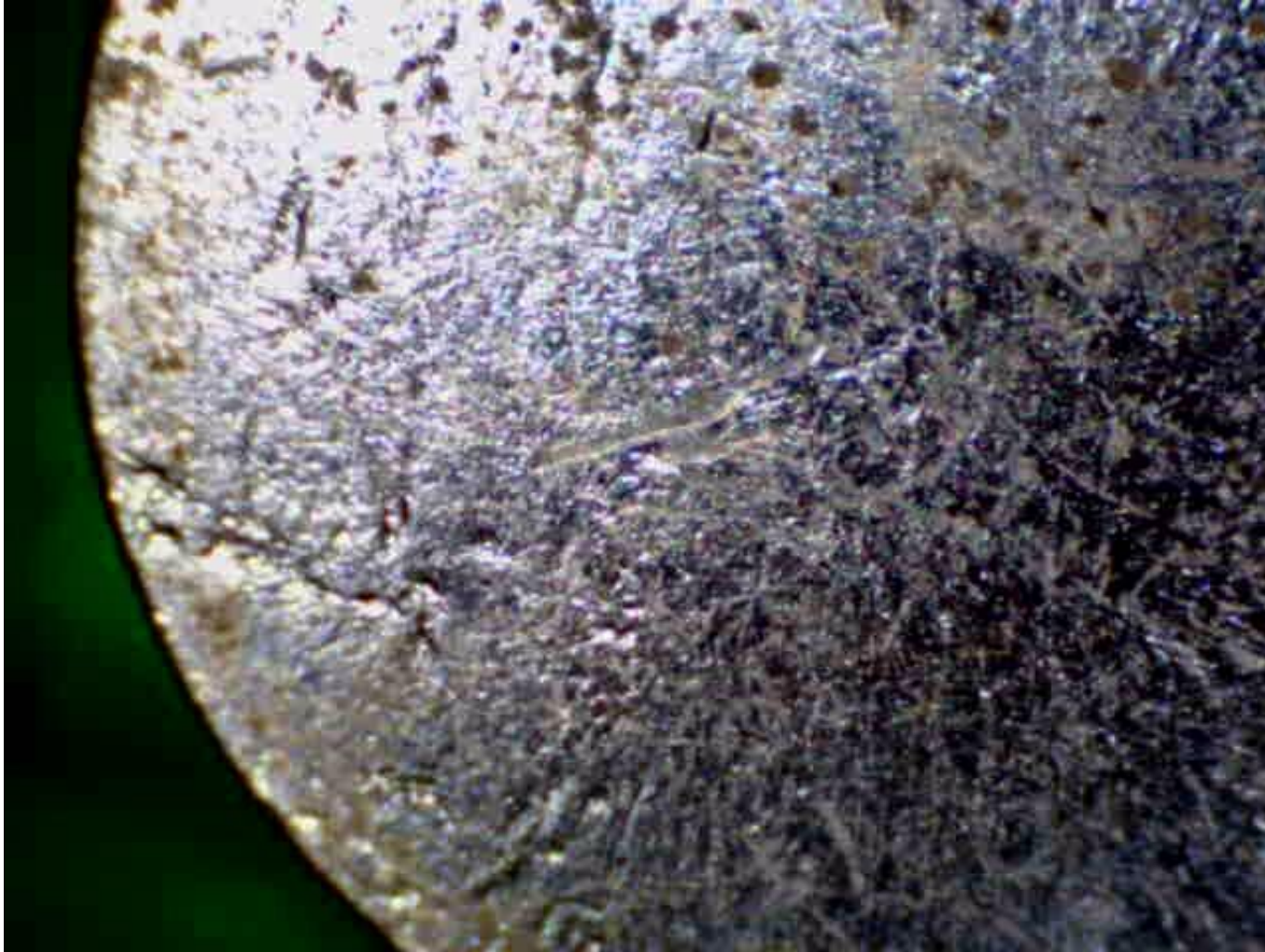




# Lockpicking - Tension

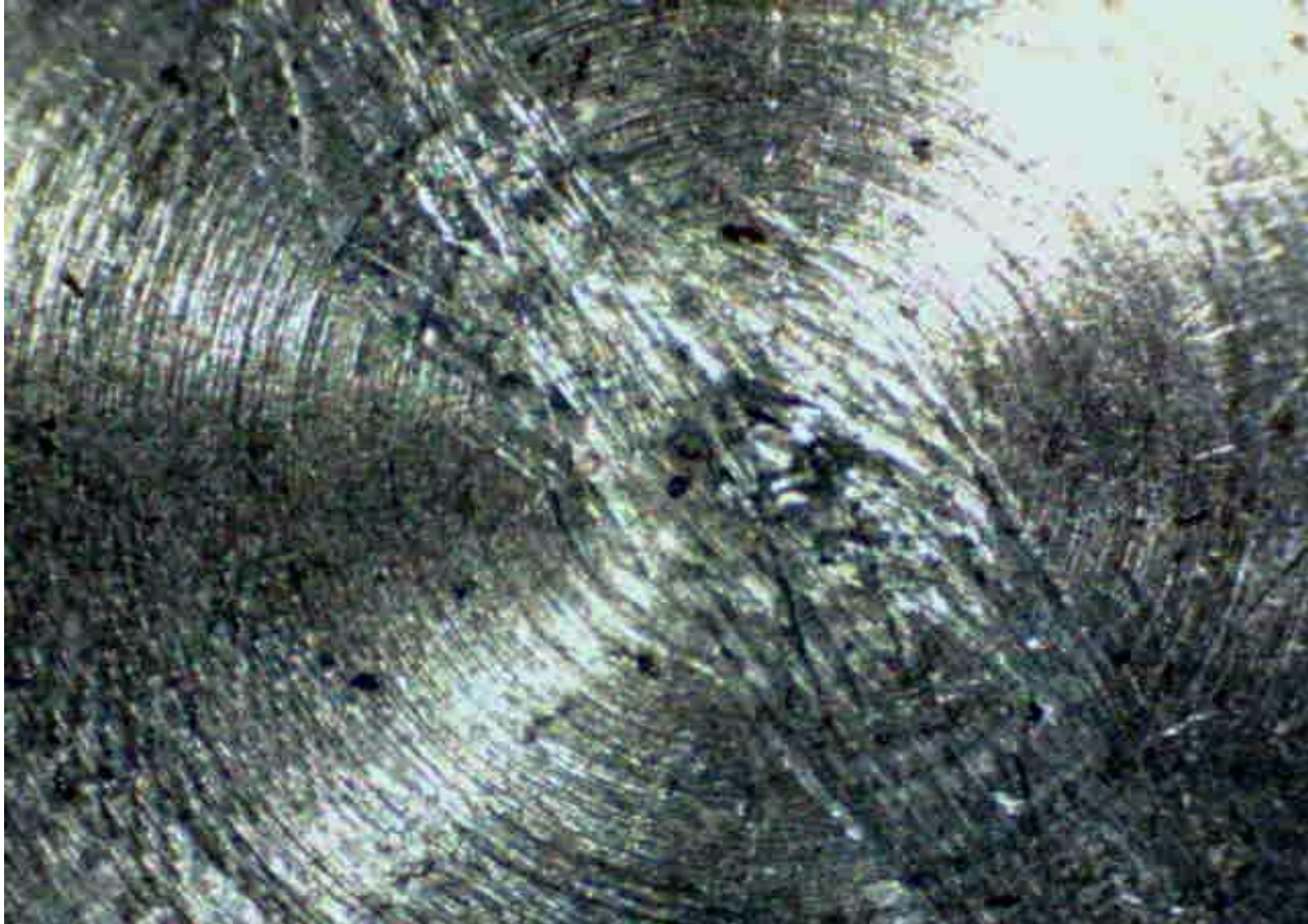


# Lockpicking - Cam

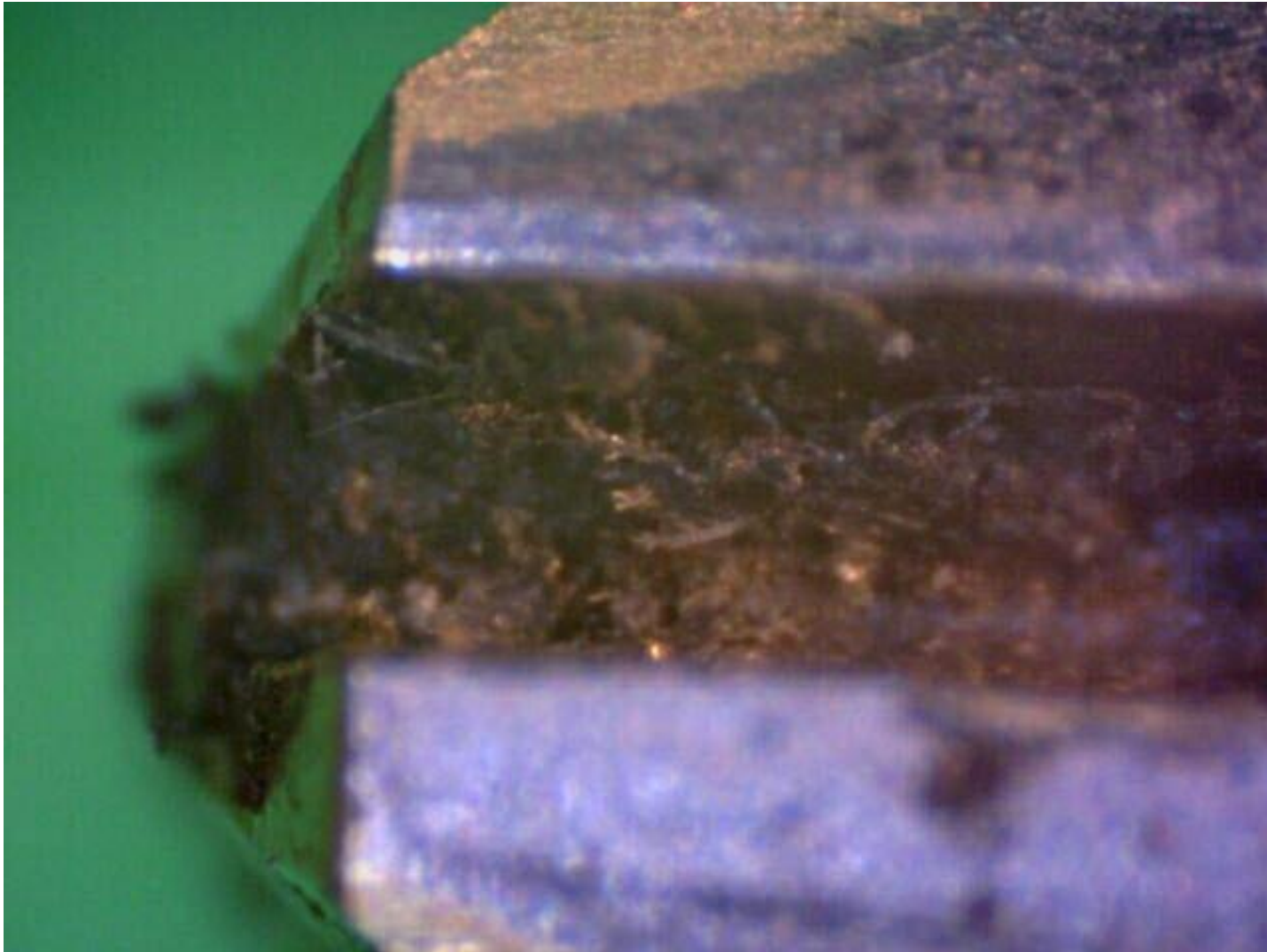




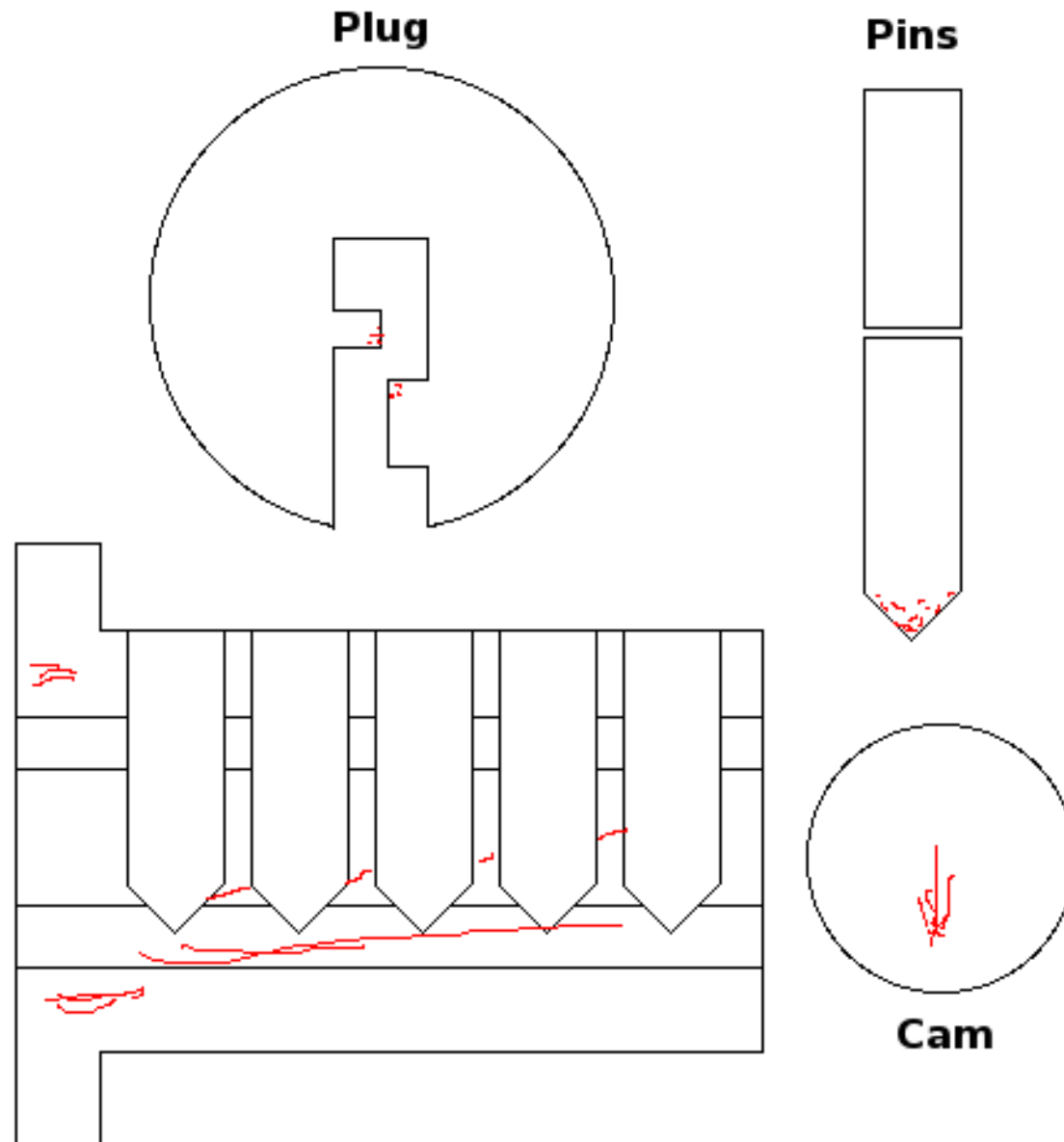
# Lockpicking - Cam



# Lockpicking - Medecoder

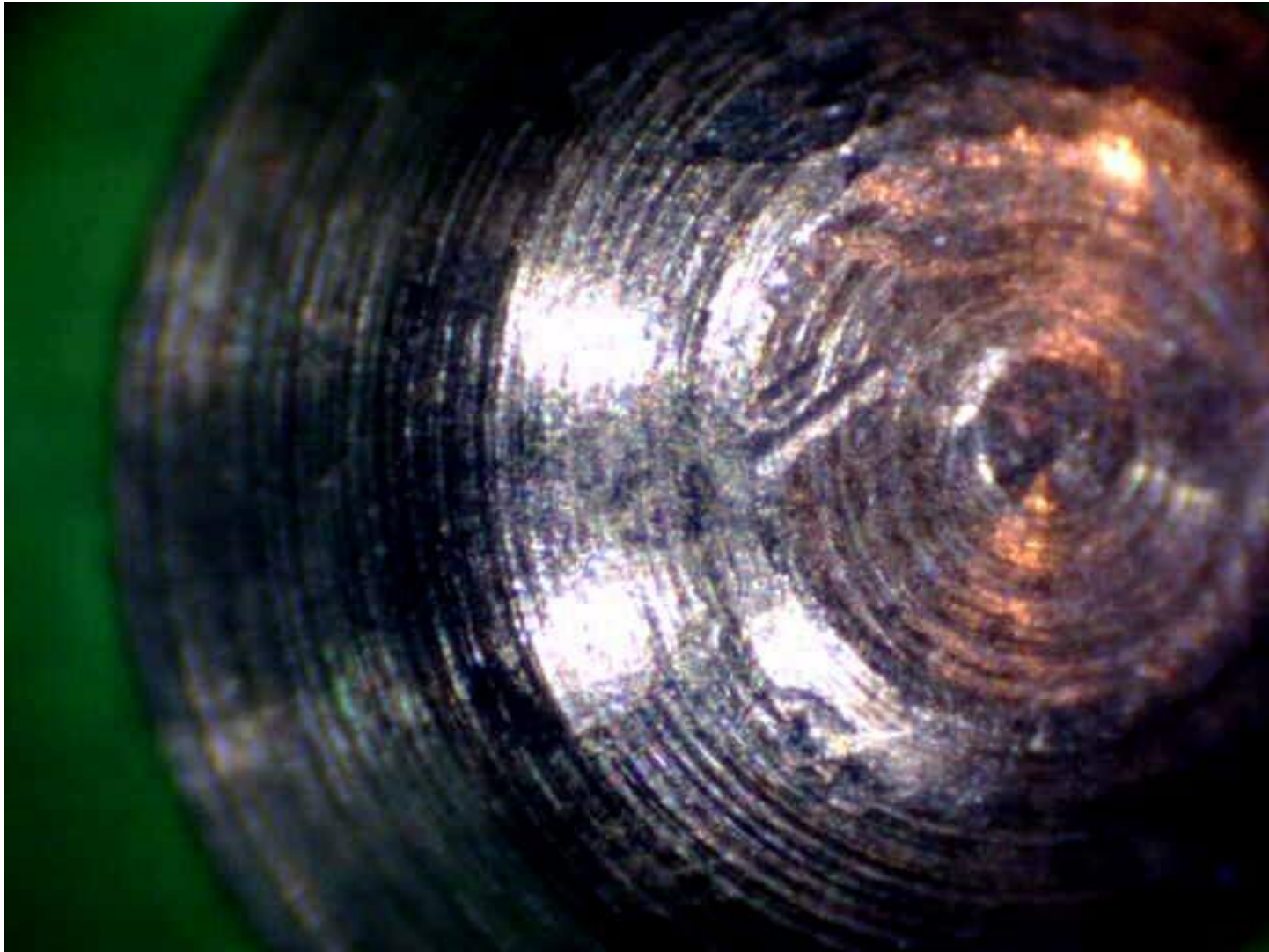


# Pick Guns





# Pick Guns - Pins

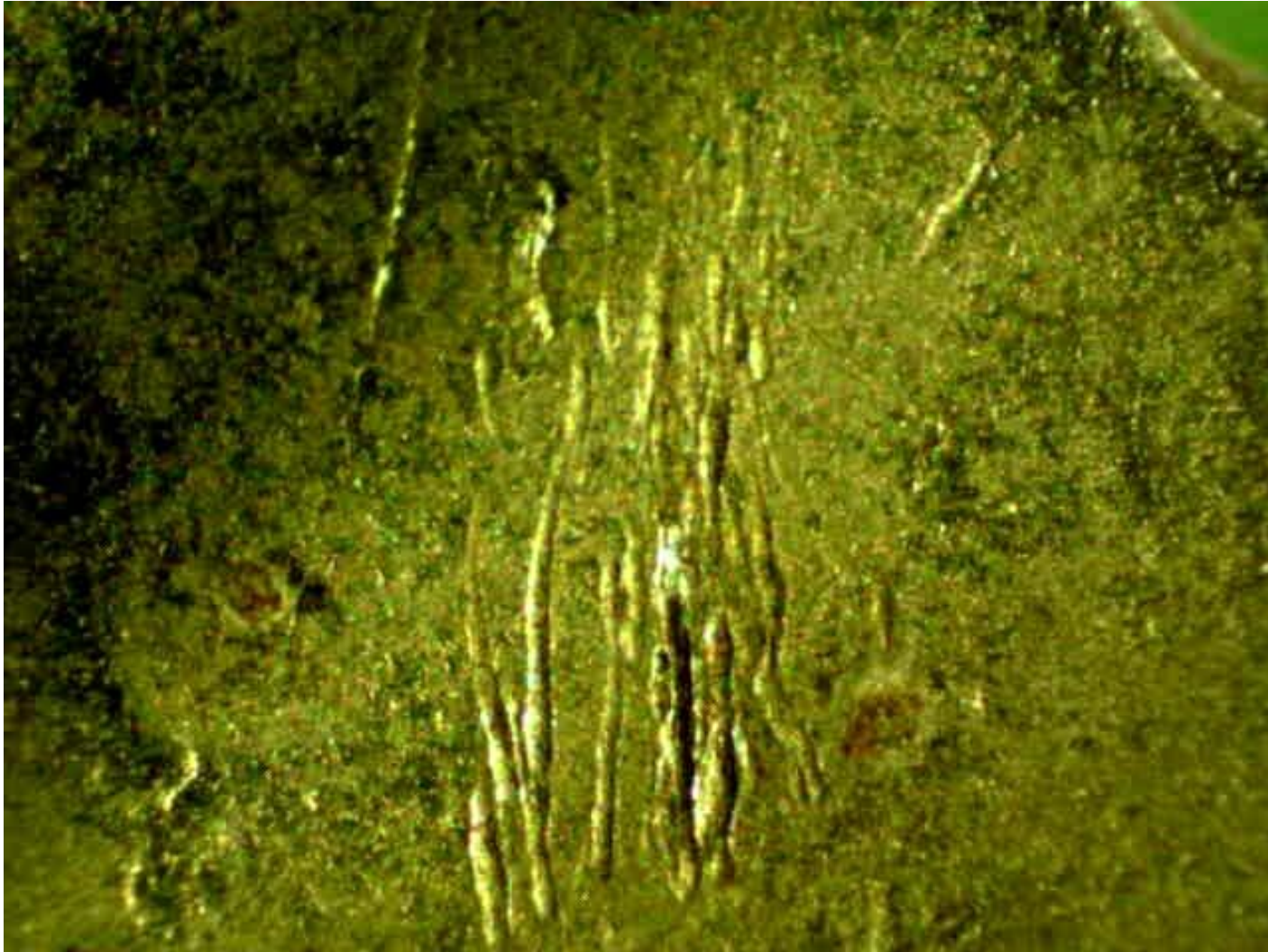


# Pick Guns - Pins



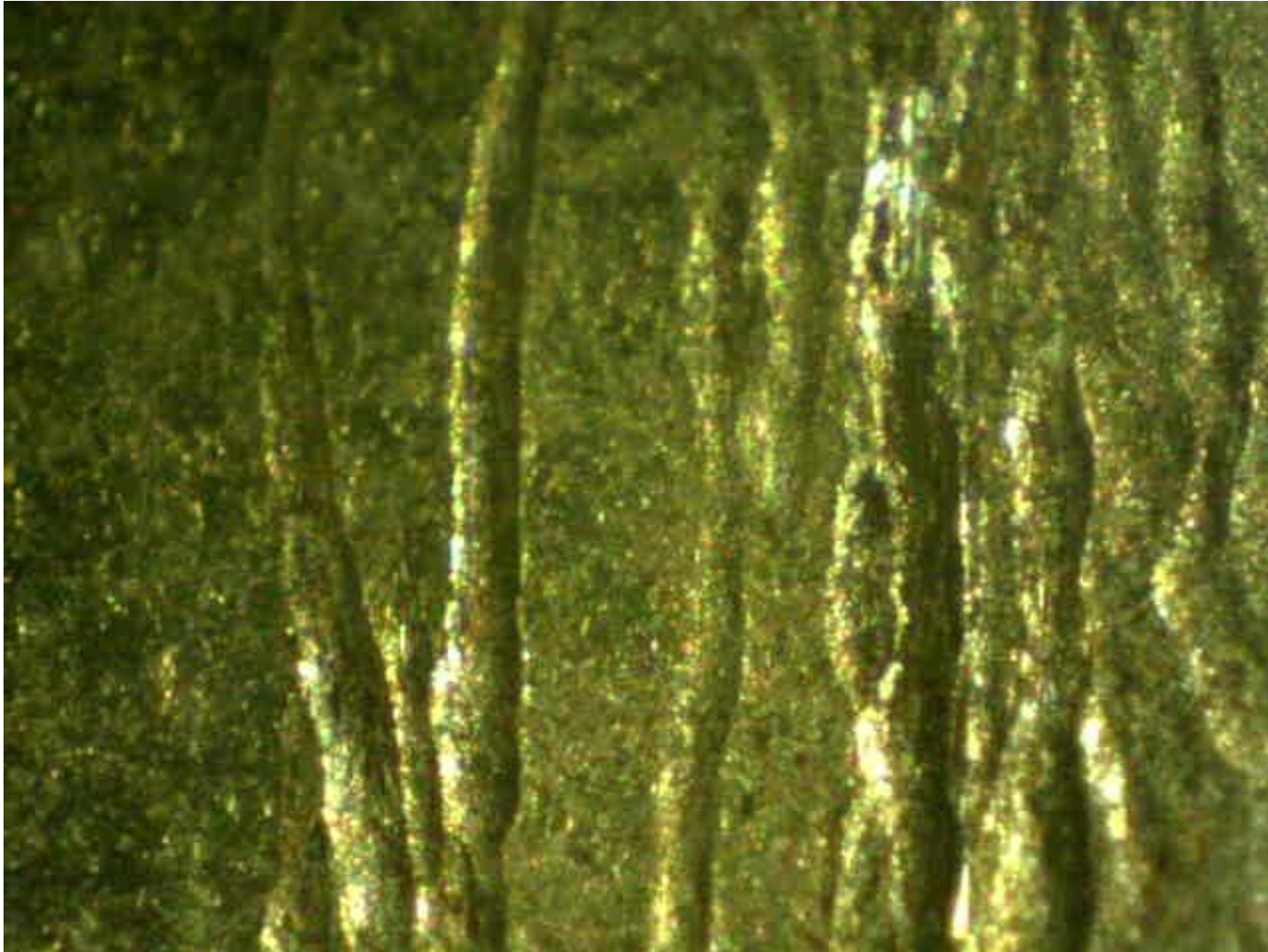


# Pick Guns - Cam





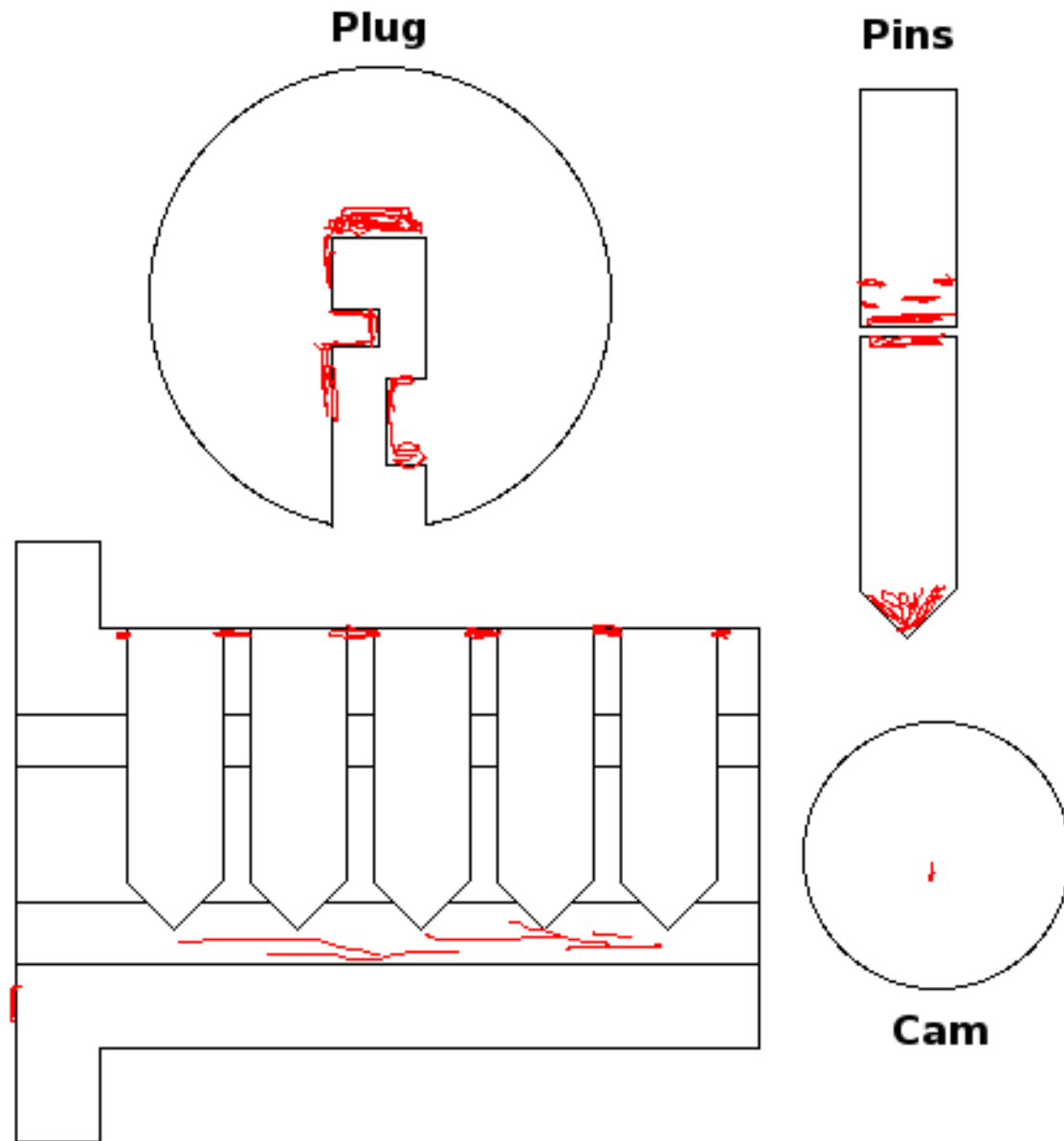
# Pick Guns - Cam



# Key Bumping



# Key Bumping

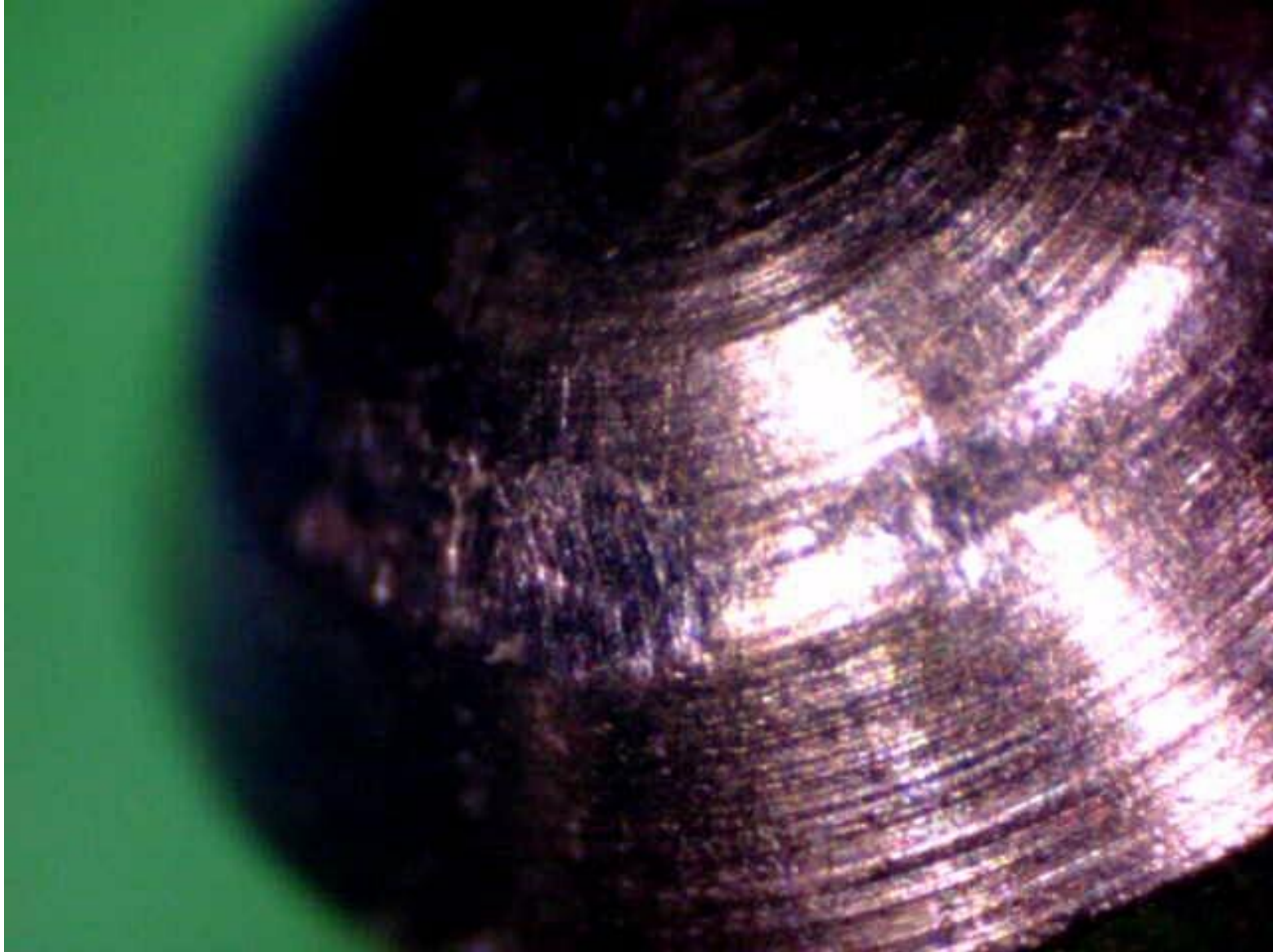




# Key Bumping - Pins



# Key Bumping - Pins





# Key Bumping - Pins





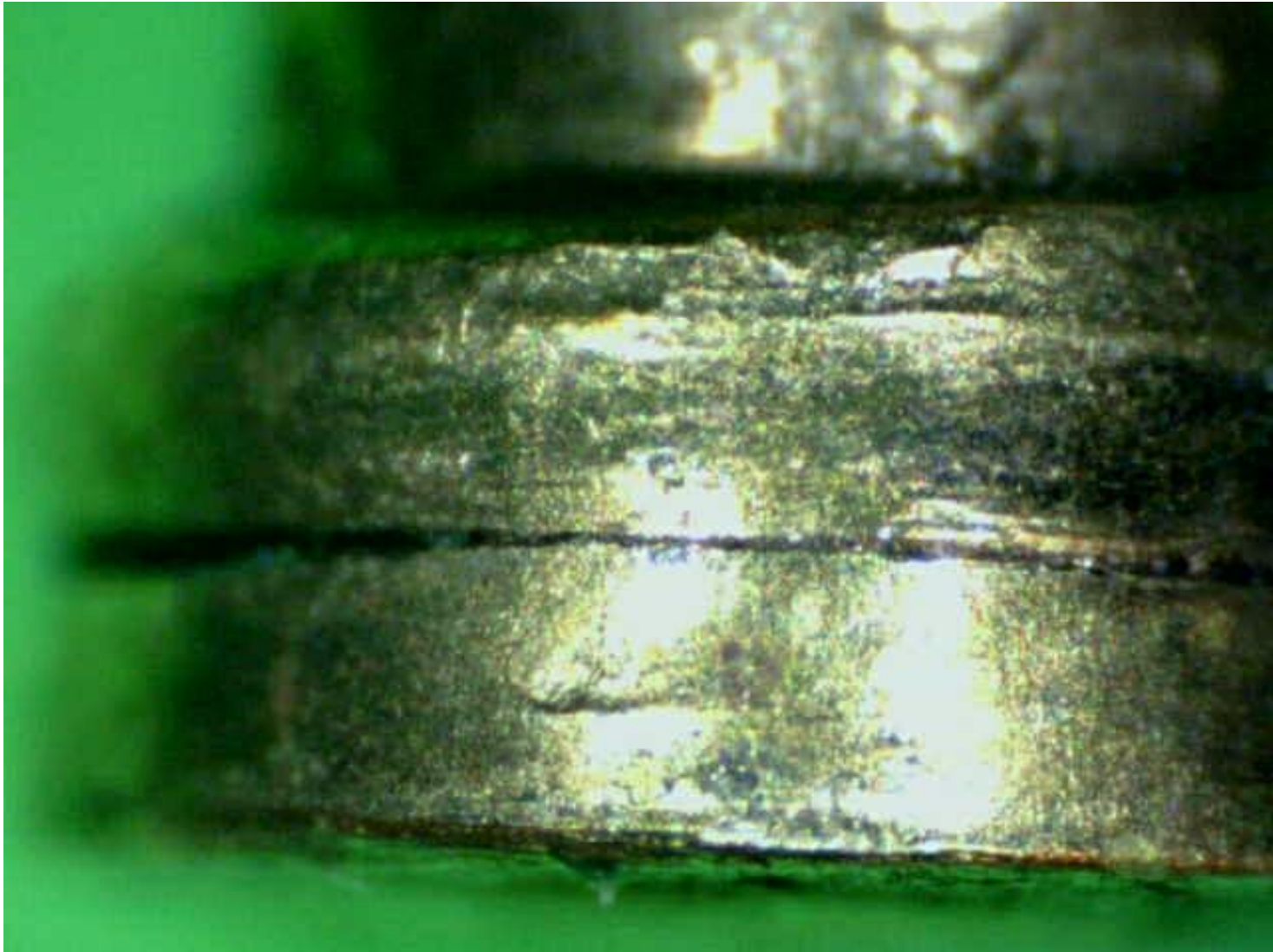
# Key Bumping - Pins



# Key Bumping - Pins



# Key Bumping - Pins

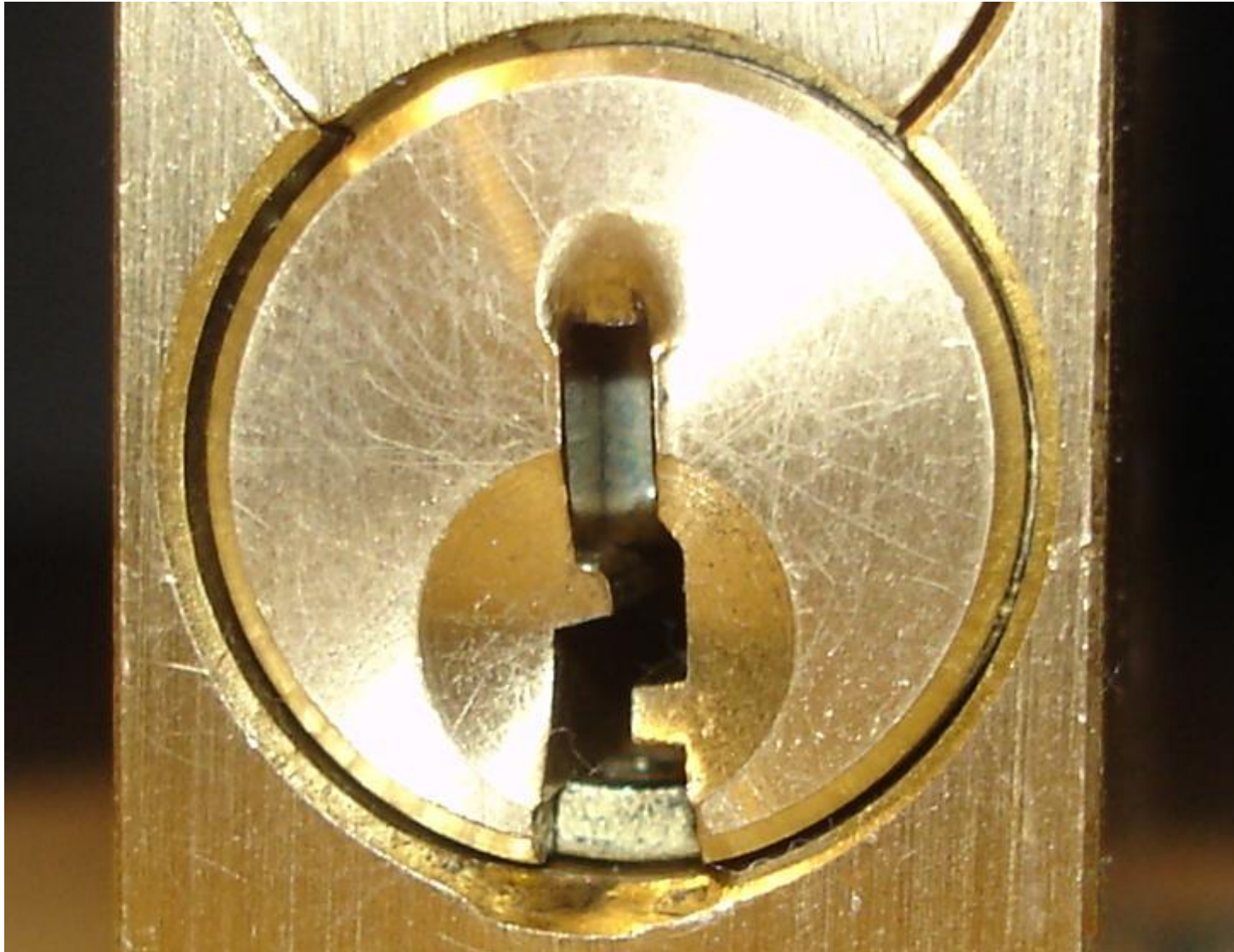




# Key Bumping - Plug



# Key Bumping - Face

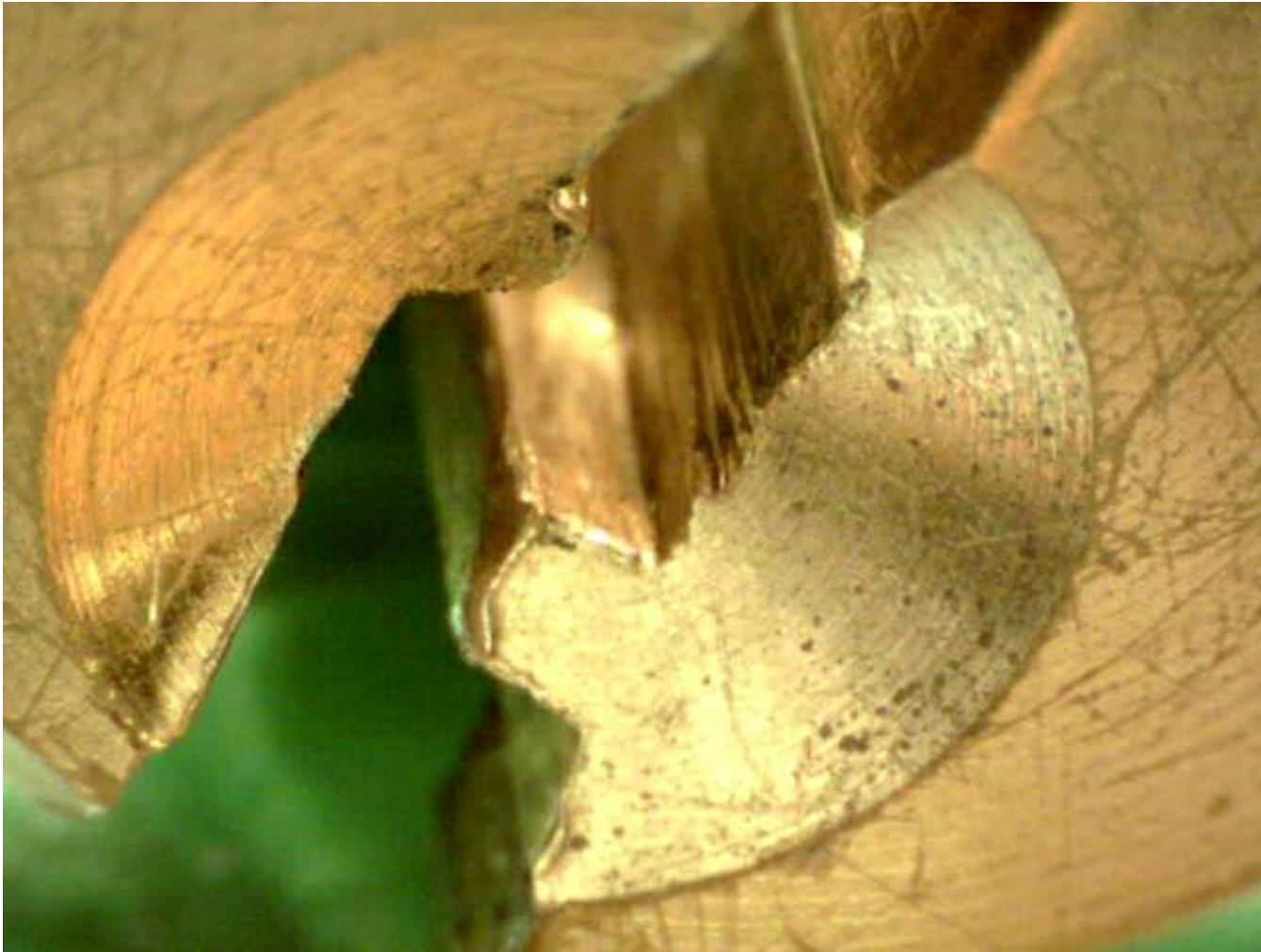


# Key Bumping - Face

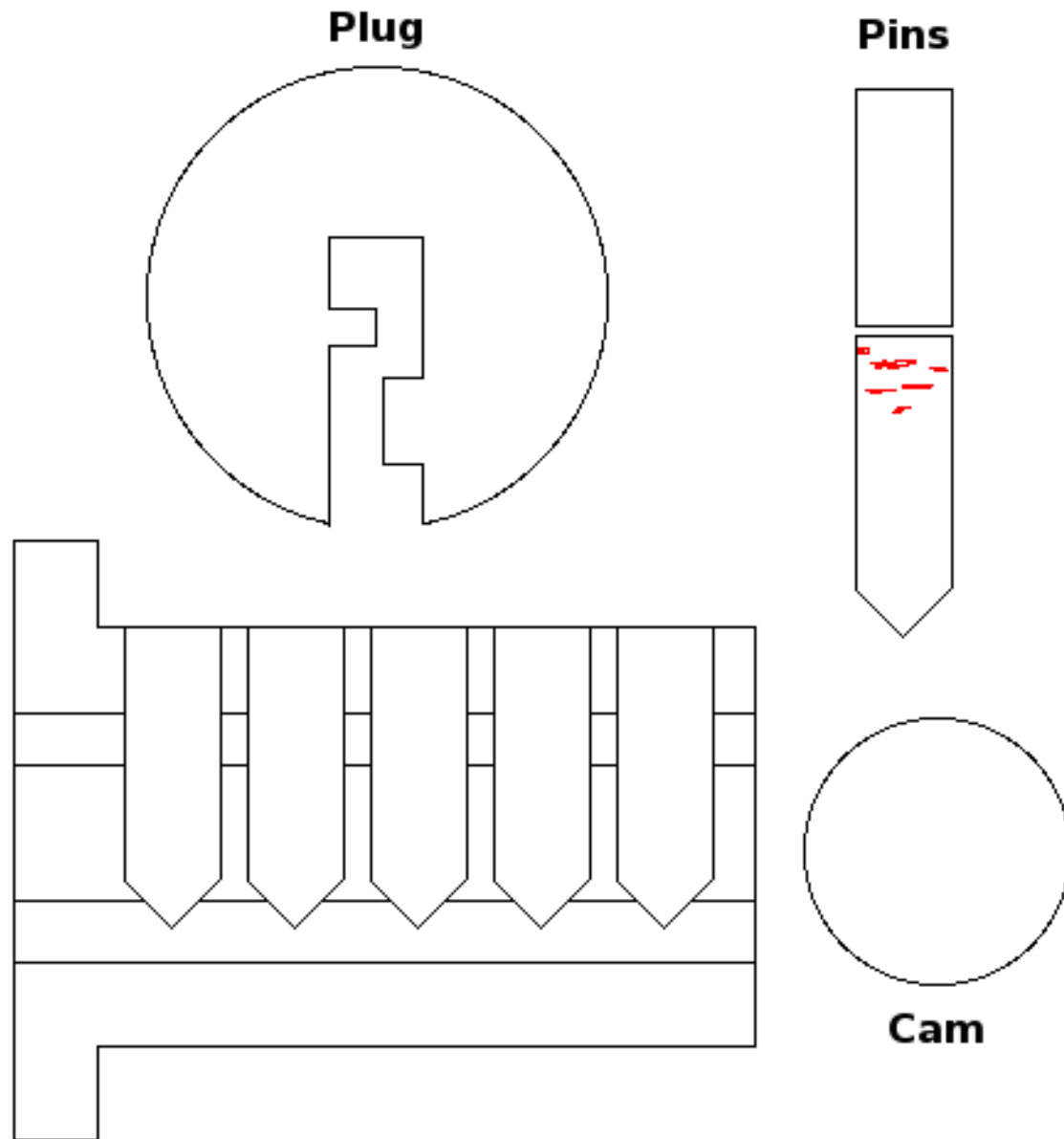




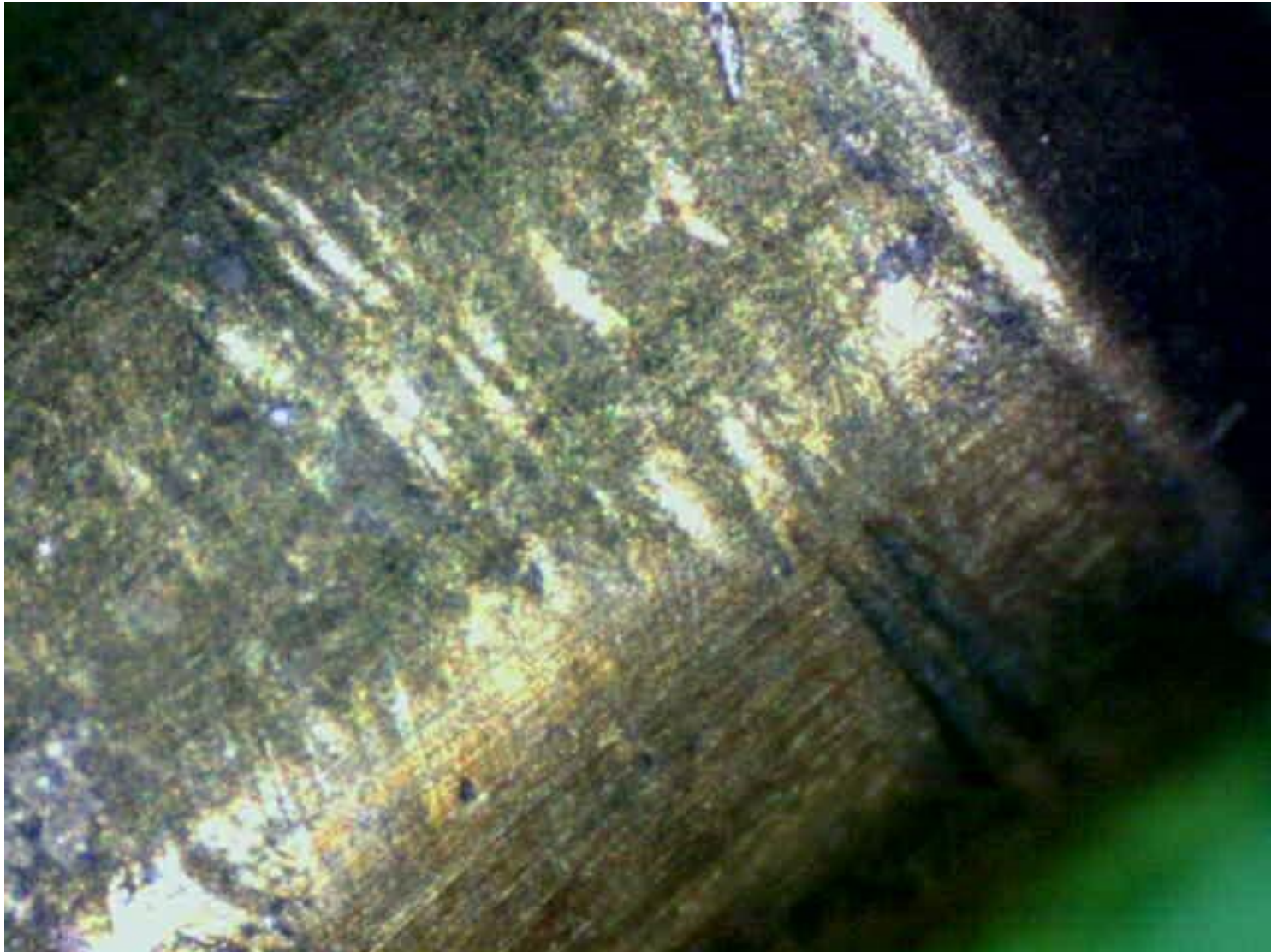
# Key Bumping - Plug



# Impressioning



# Impressioning - Manipulation





# Impressioning - Manipulation



# Impressioning - Plug



# Impressioning - UV residue





# Impressioning - UV Residue



# Decoding

- Depends on technique
- Covert vs. surreptitious
  
- Decoder “pick”
- Manipulation
- Visual/Optical
- Thermal
- Radiological

# Decoding - Visual



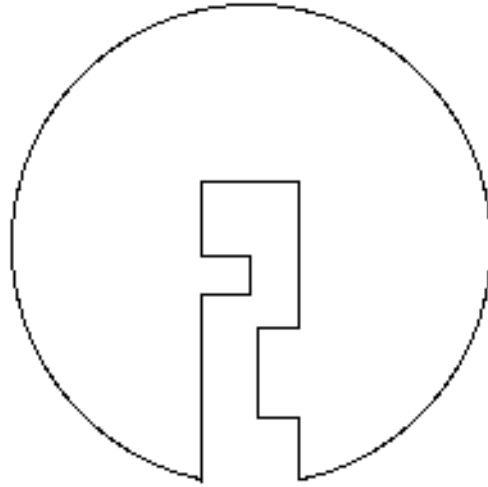


# Decoding - Visual

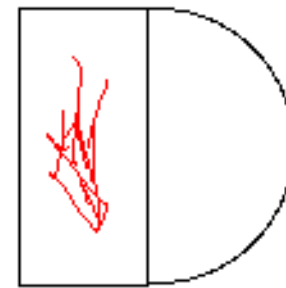
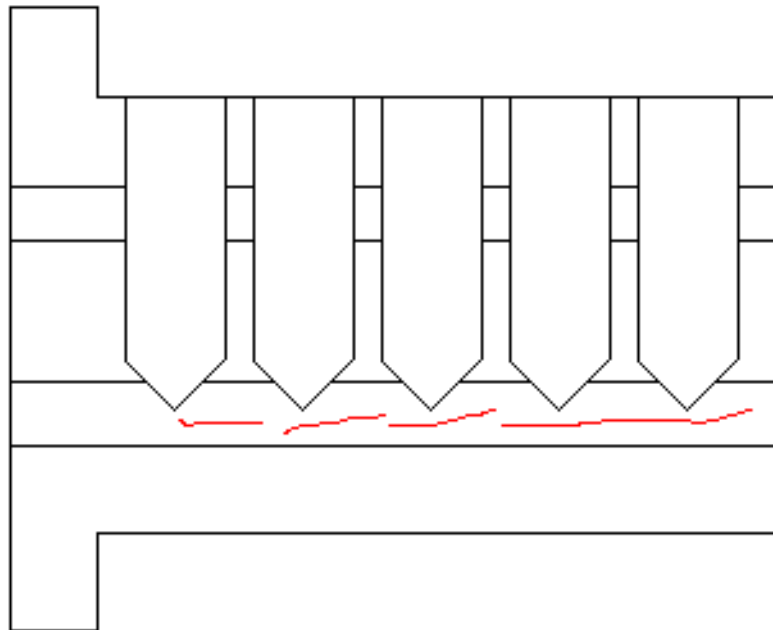


# Bypass

**Plug**



**Pins**



**Cam**

# Bypass





# Bypass



# Key Analysis

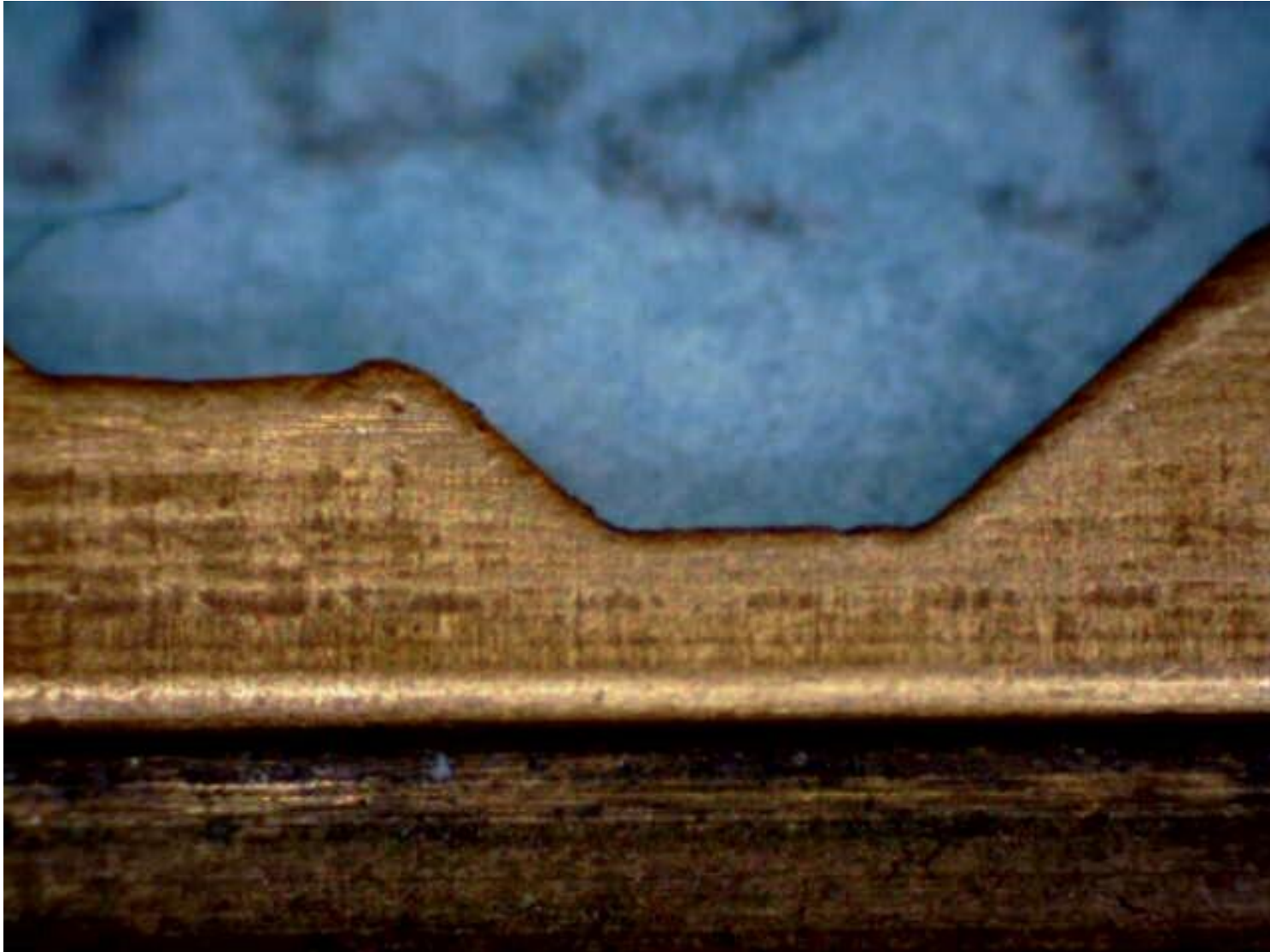
- Material, keyway, cuts, codes
- Original or duplicate
- Hand cut or machined
- Recent cutting, copying
- Material transfer

# Keys - Plating

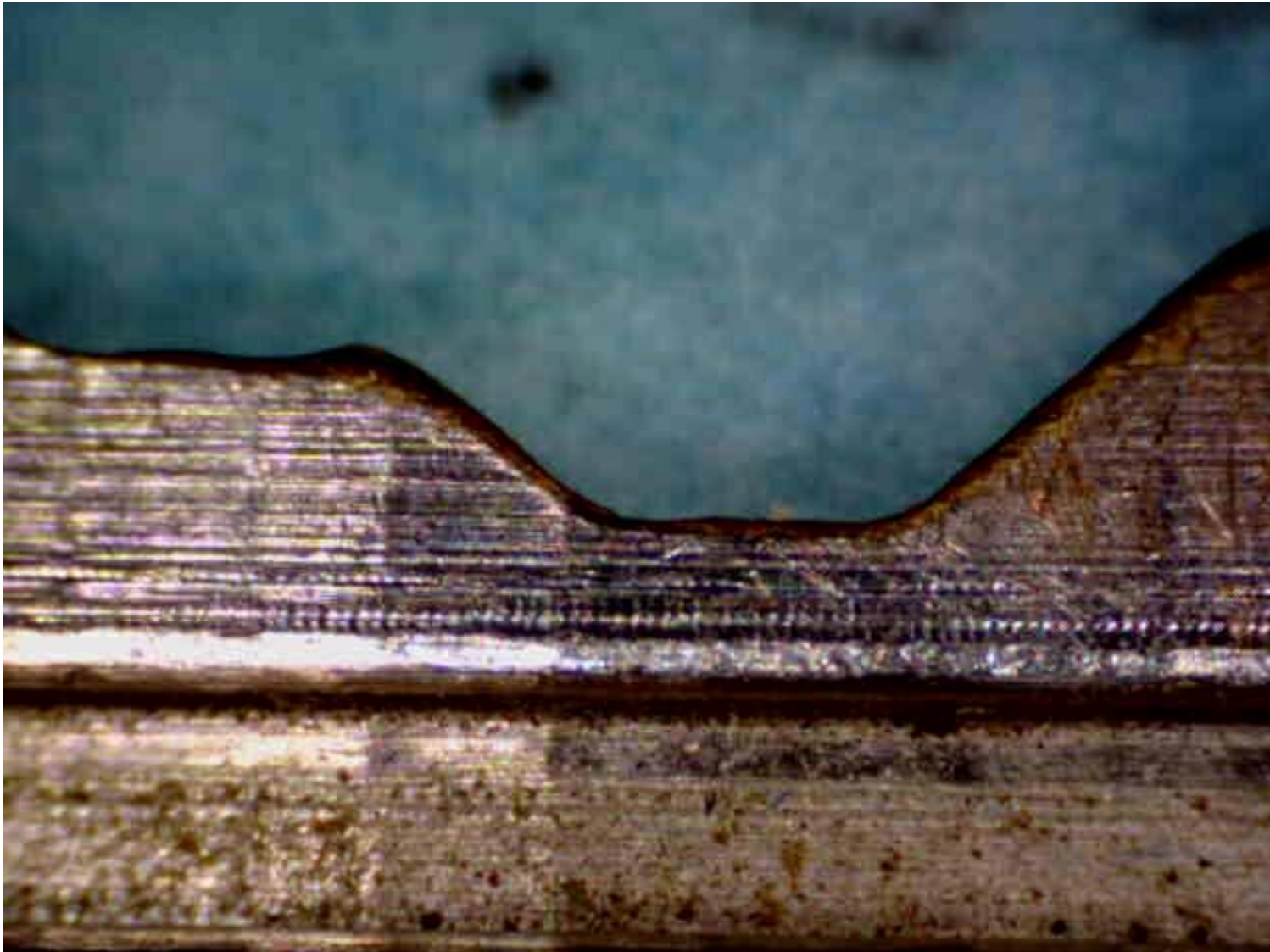




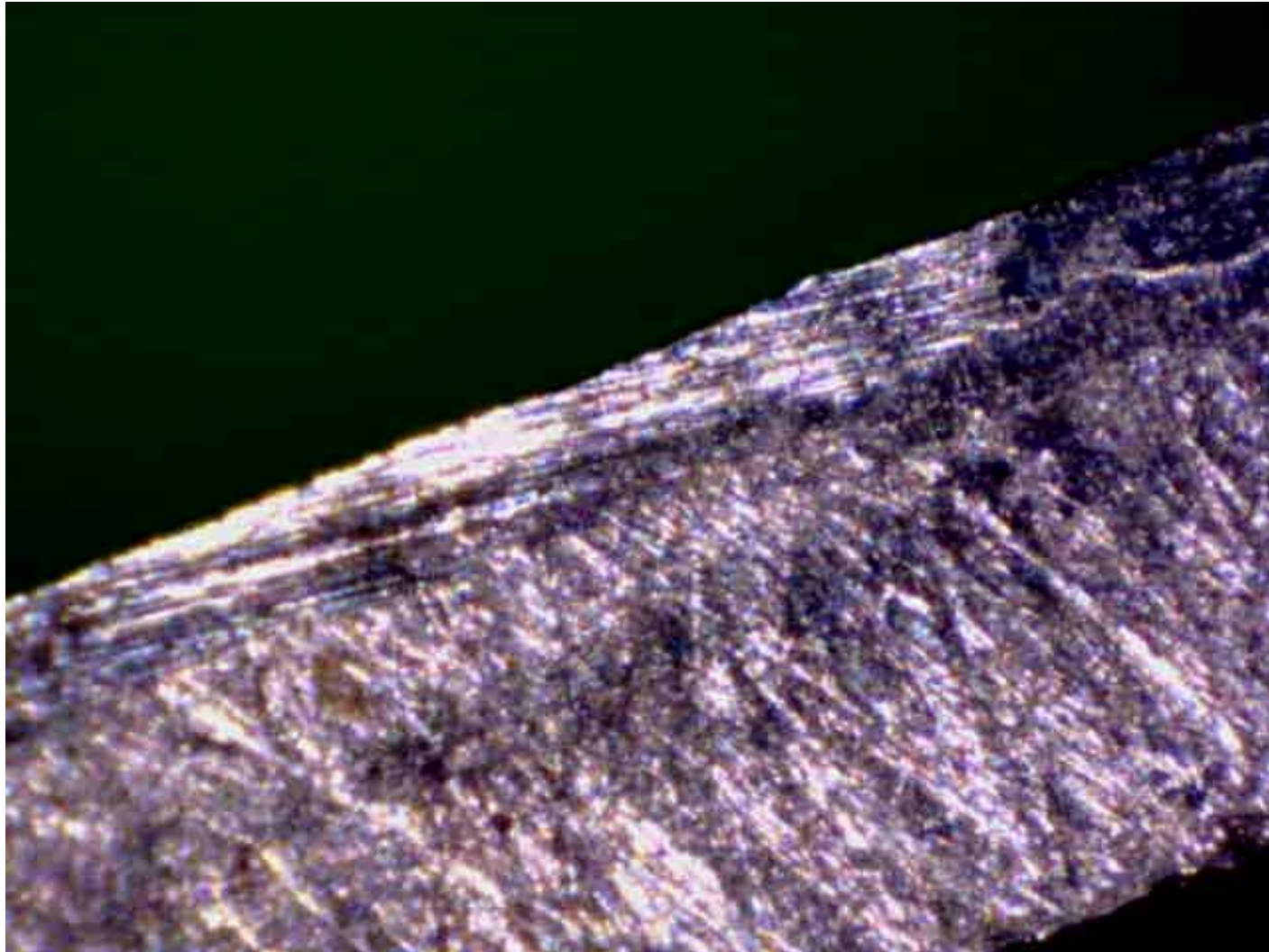
# Keys - Original vs Copied



# Keys - Original vs Copied

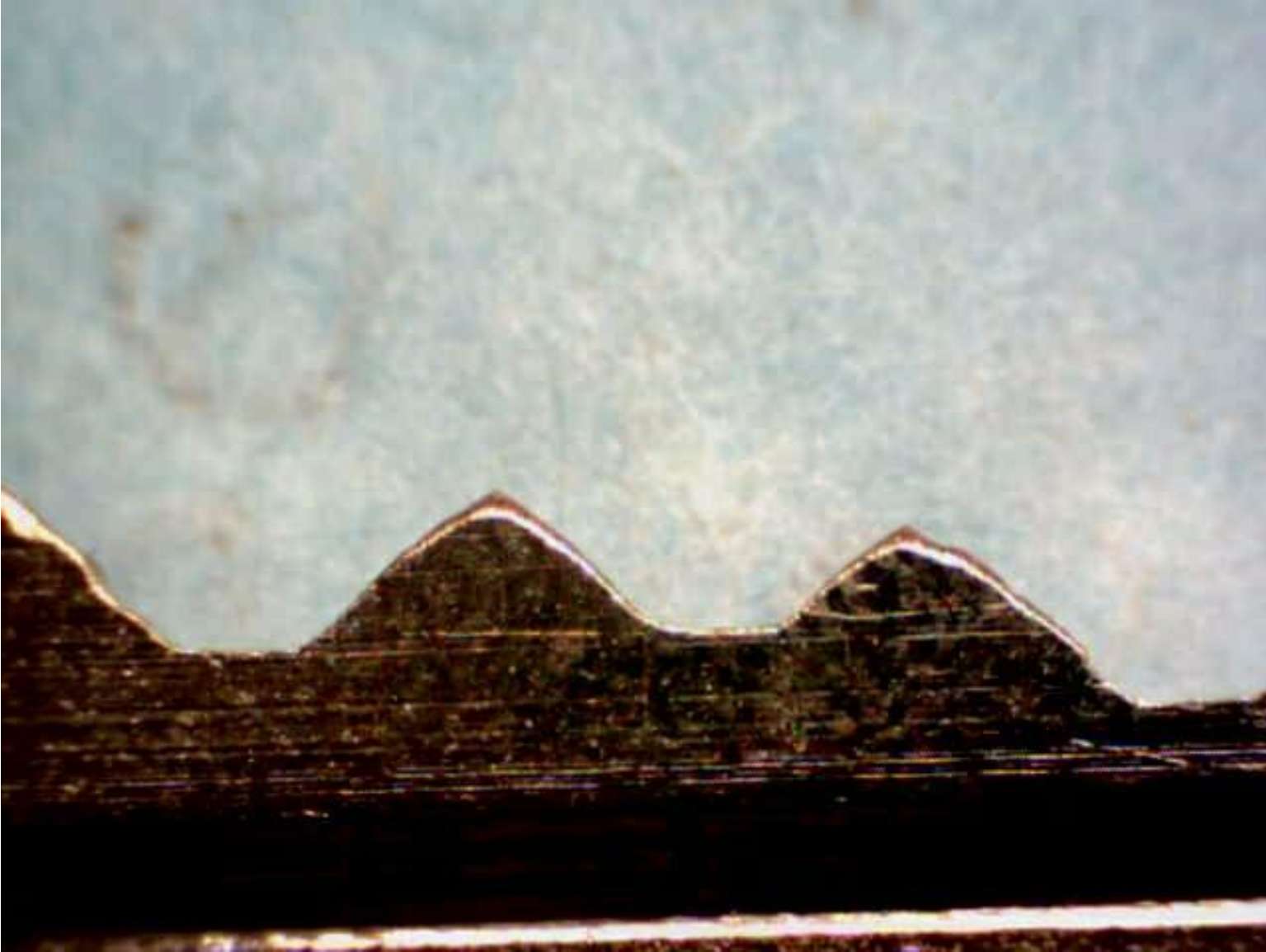


# Keys - Stylus striae





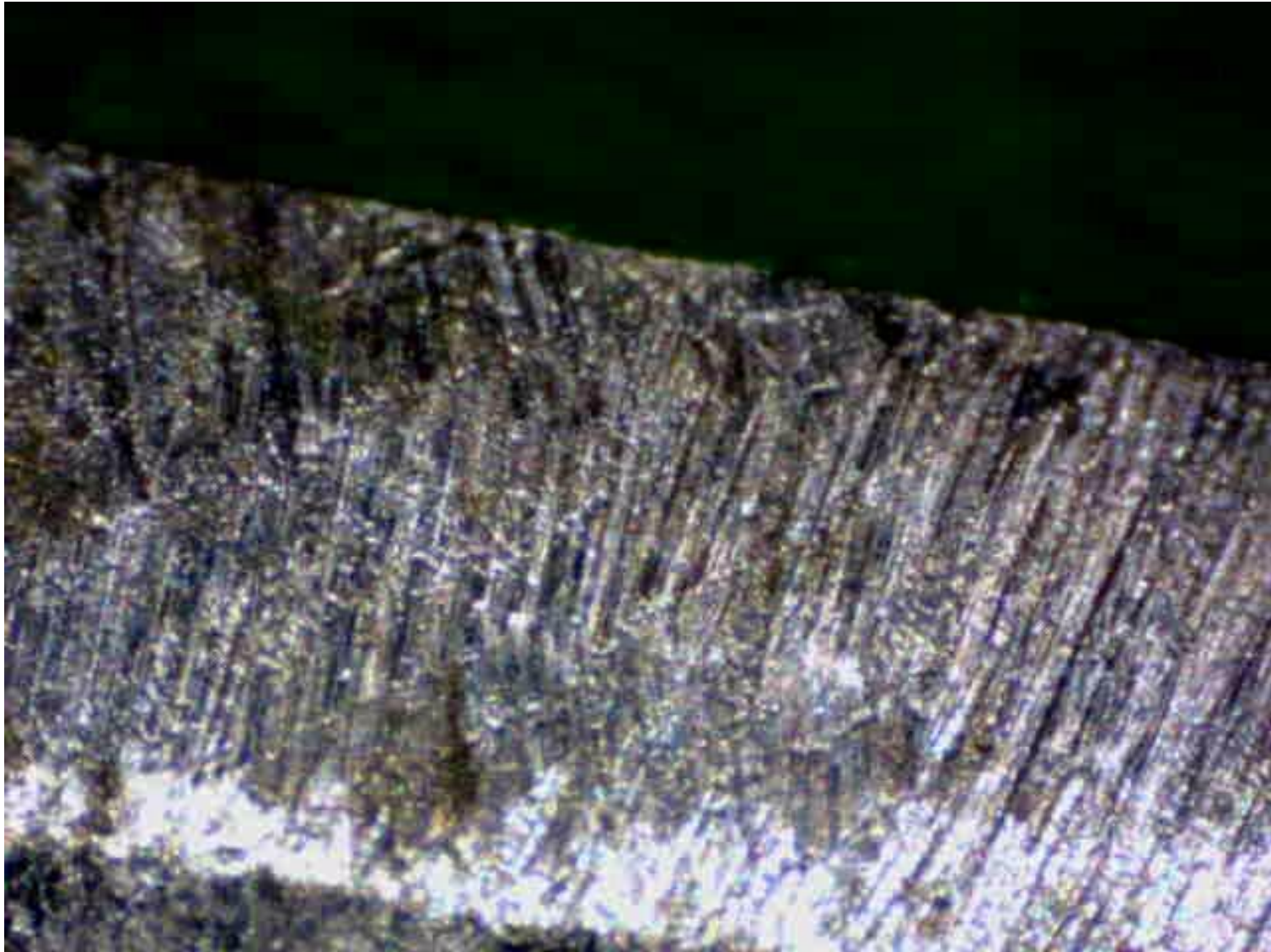
# Keys - Hand made



# Keys - Filed

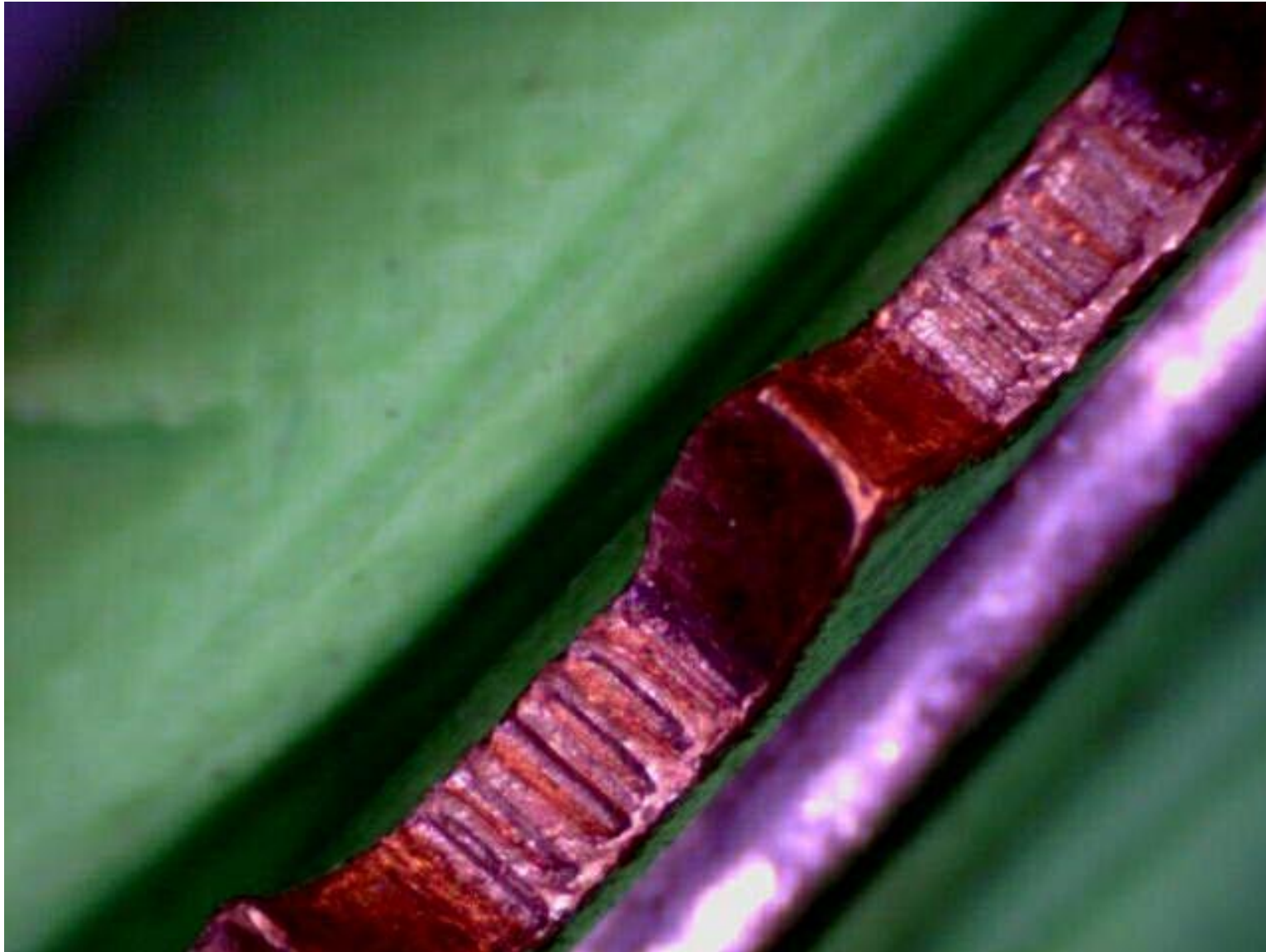


# Keys - Filed

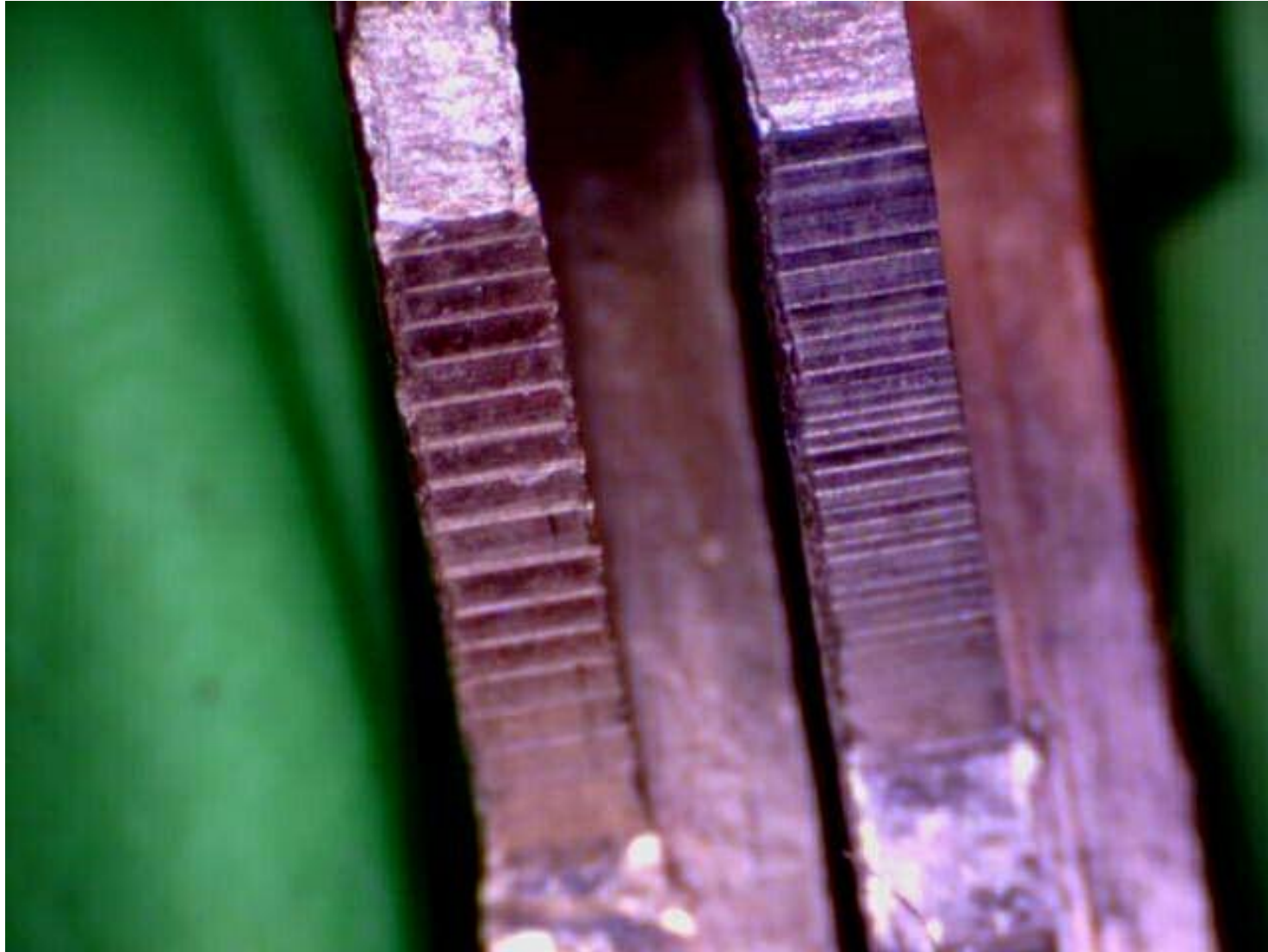




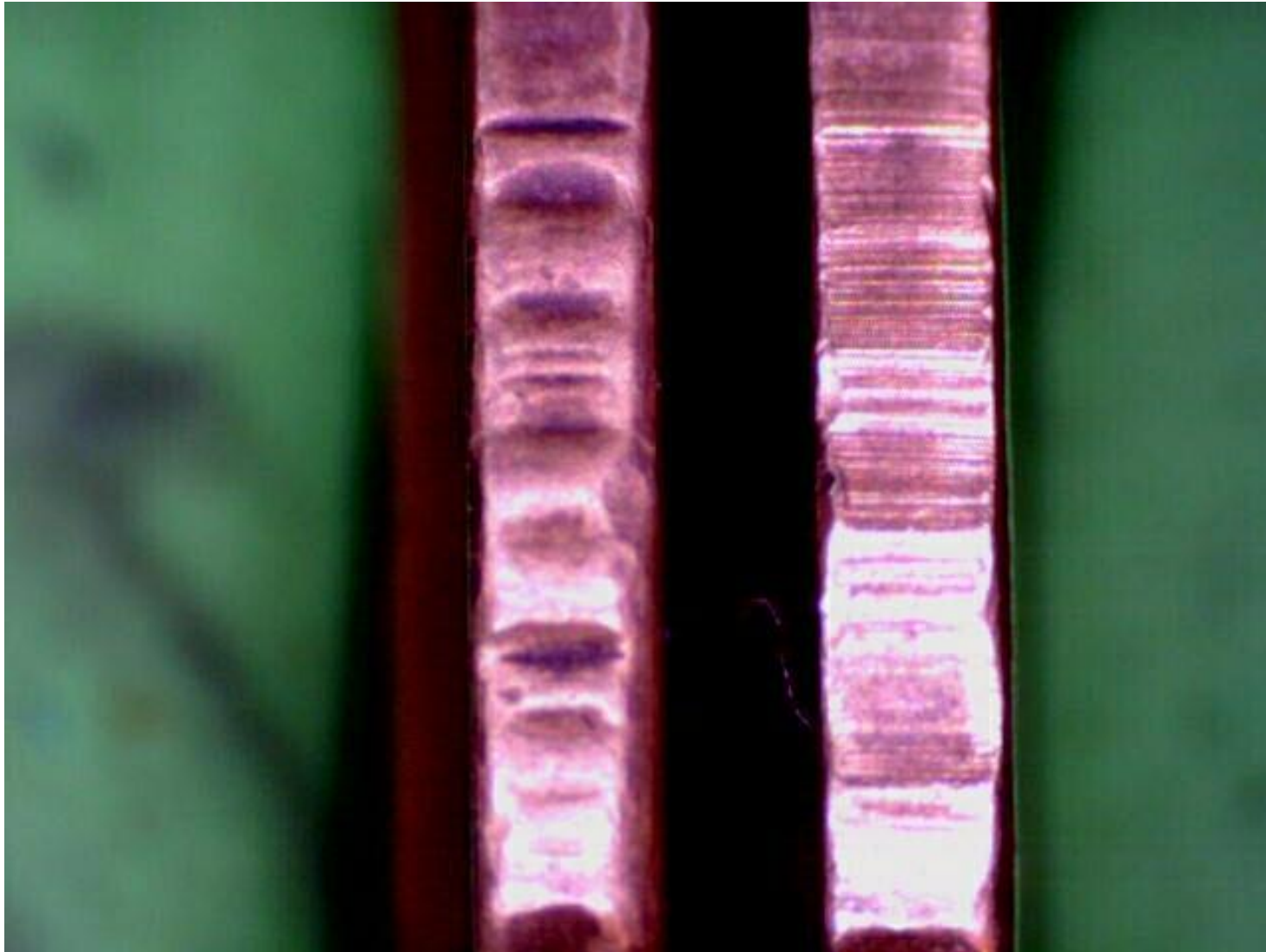
# Keys - Dremel



# Keys - Cutting Wheels

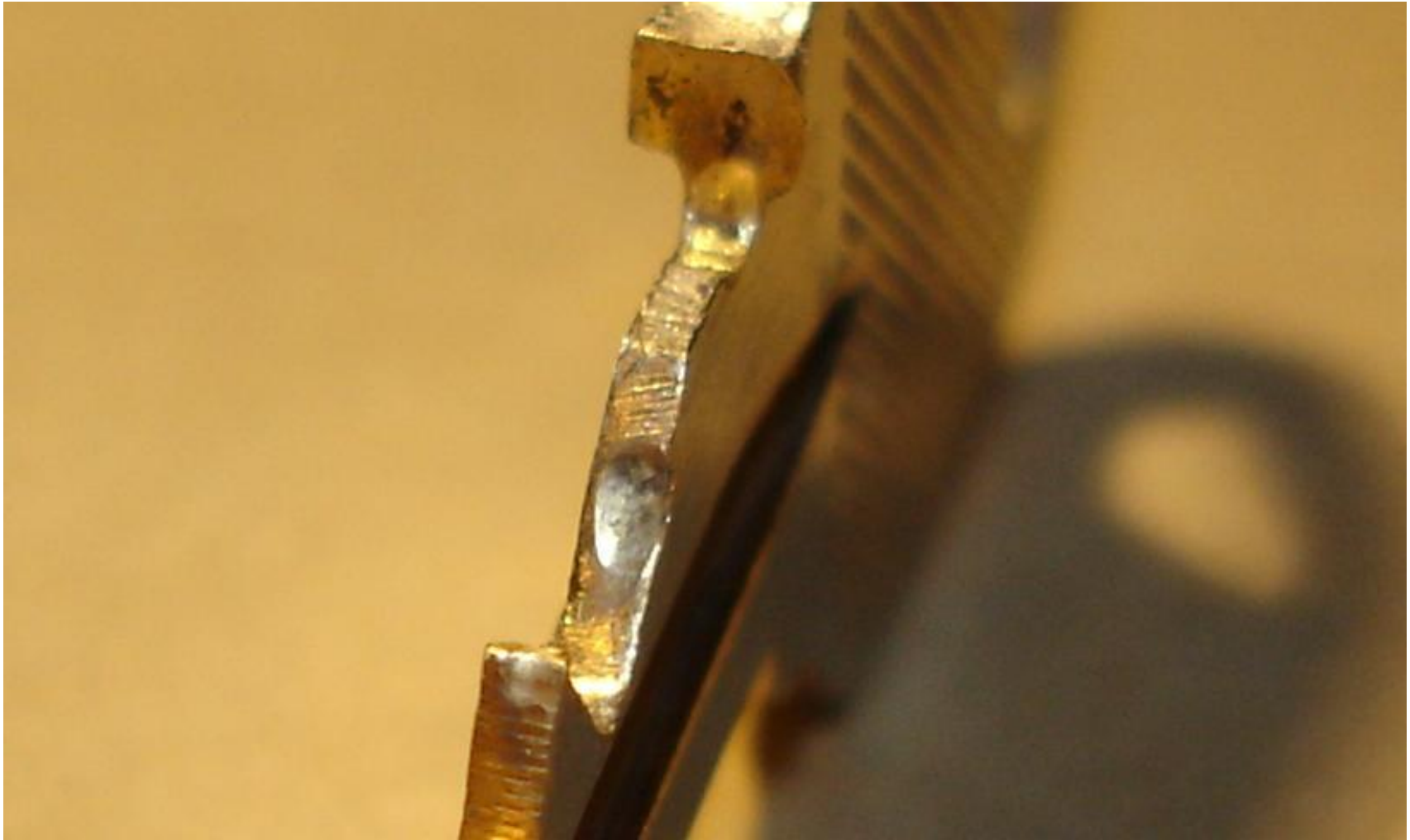


# Keys - Comparison





# Key - Bumping



# Keys - Bumping



# Keys - Tool Marks

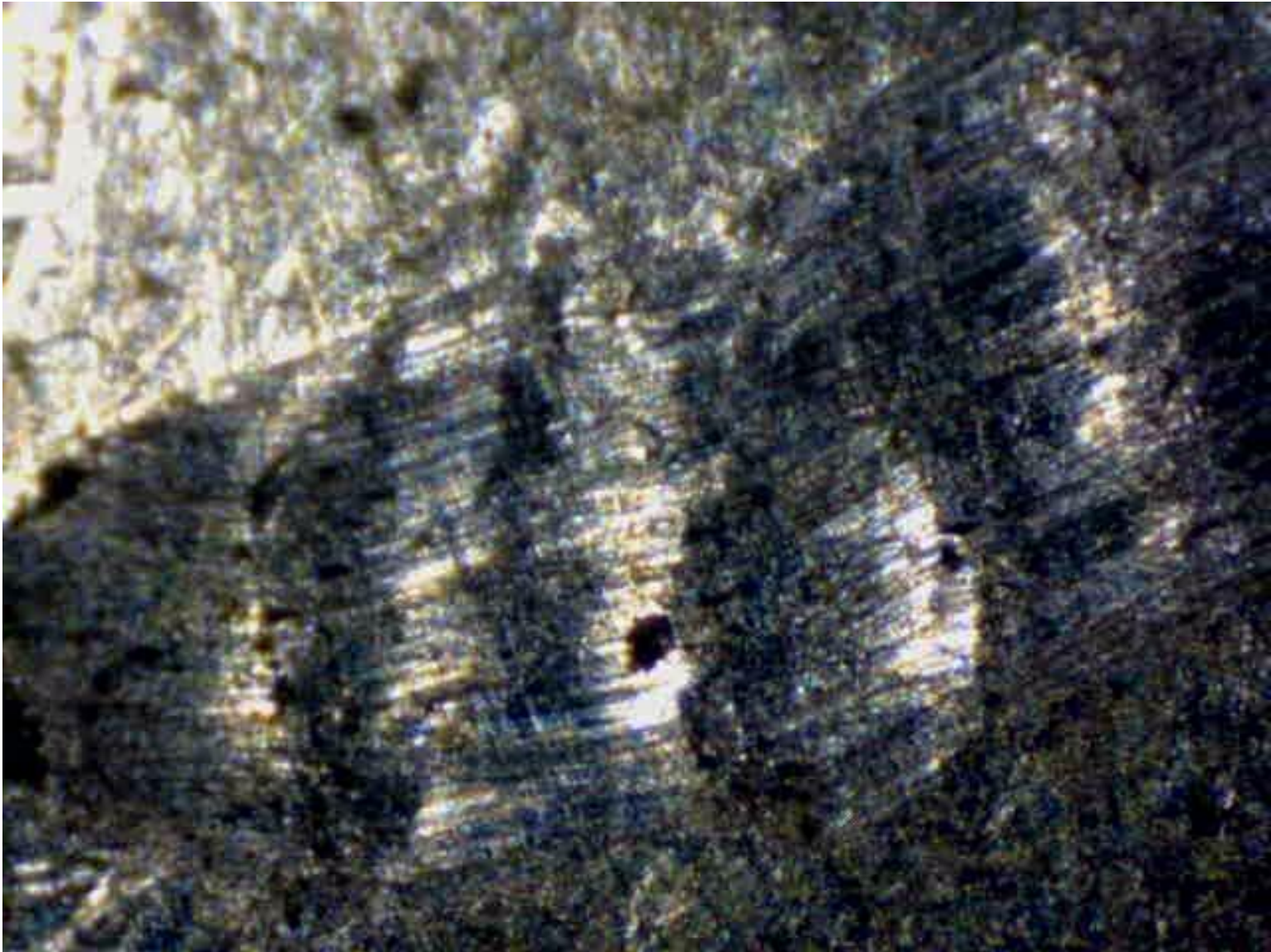




# Keys - Tool Marks

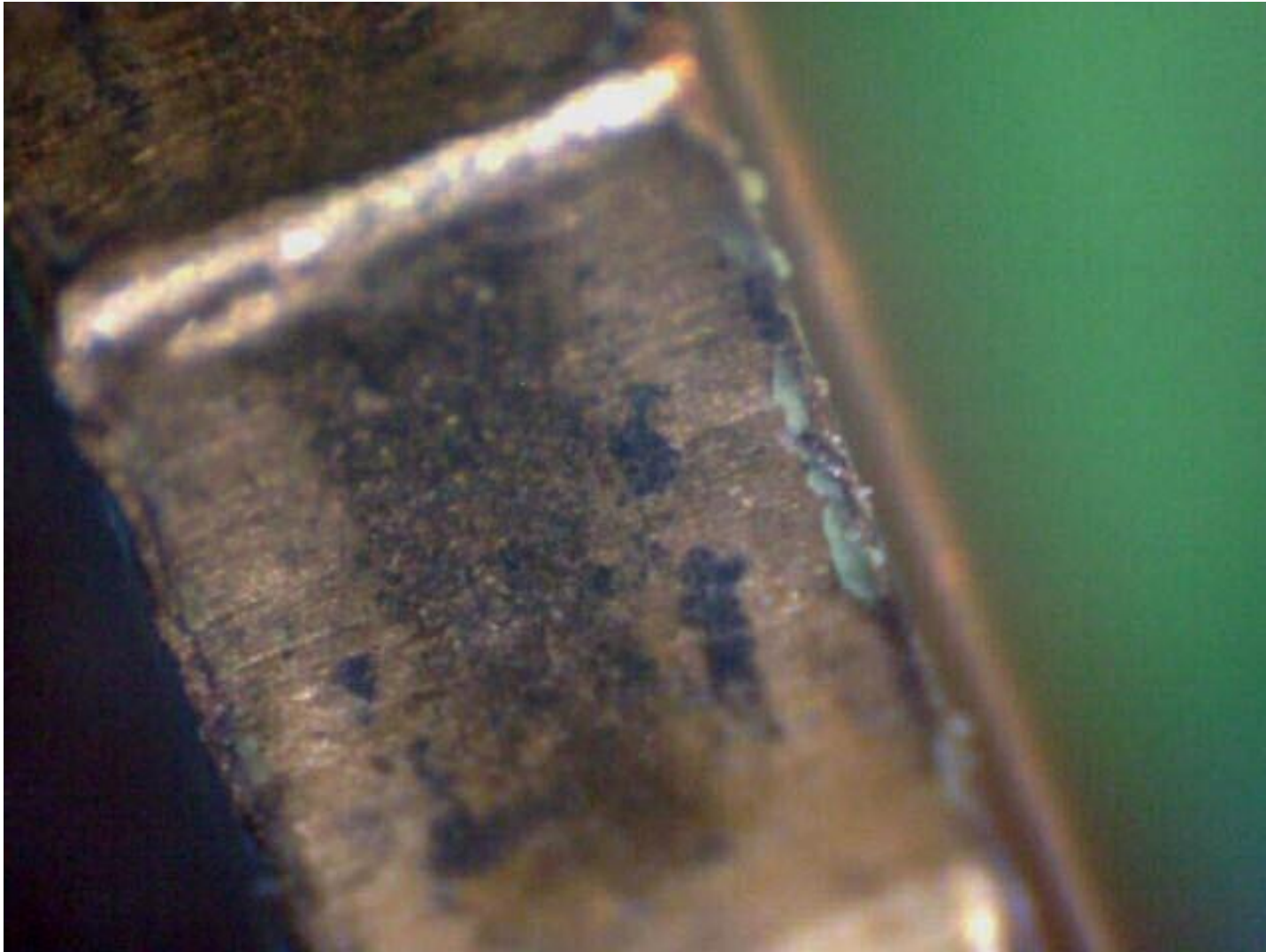


# Keys - Tool Marks





# Keys - Clay residue





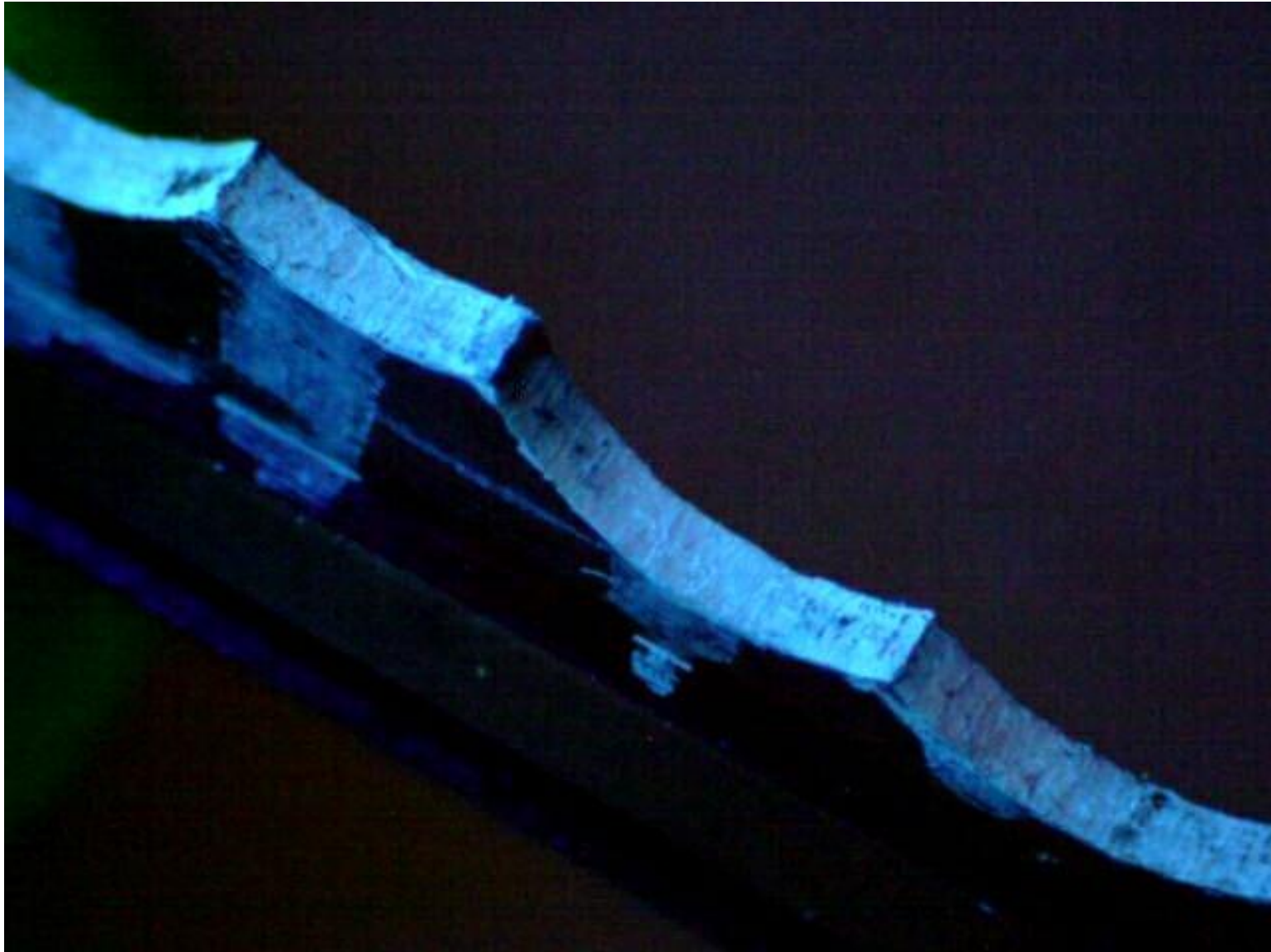
# Keys - Wax residue



# Keys - Wax residue



# Keys - UV Residue





# Anti-forensics Tools?

- Possible!
- Difficult to use
- Limited durability
- Expensive\*

# Safe/Vault Forensics

- Drill points
- Writing/markings
- Magnetic/adhesive
- Tool marks



# Investigative Process

- Crime scene investigation
- Laboratory examination
- Investigative report
- Testimony



# Crime Scene Investigation

- Photographs
- Sketches
- Permission issues
- Evidence preservation
- Chain of custody
  
- Police vs. Insurance

# Initial Questions

- Purchase/Installation
- Per day usage
- Security rating(s)
- Key/combo distribution
- Lock condition
  - Working?
  - Repaired?
  - Replaced?

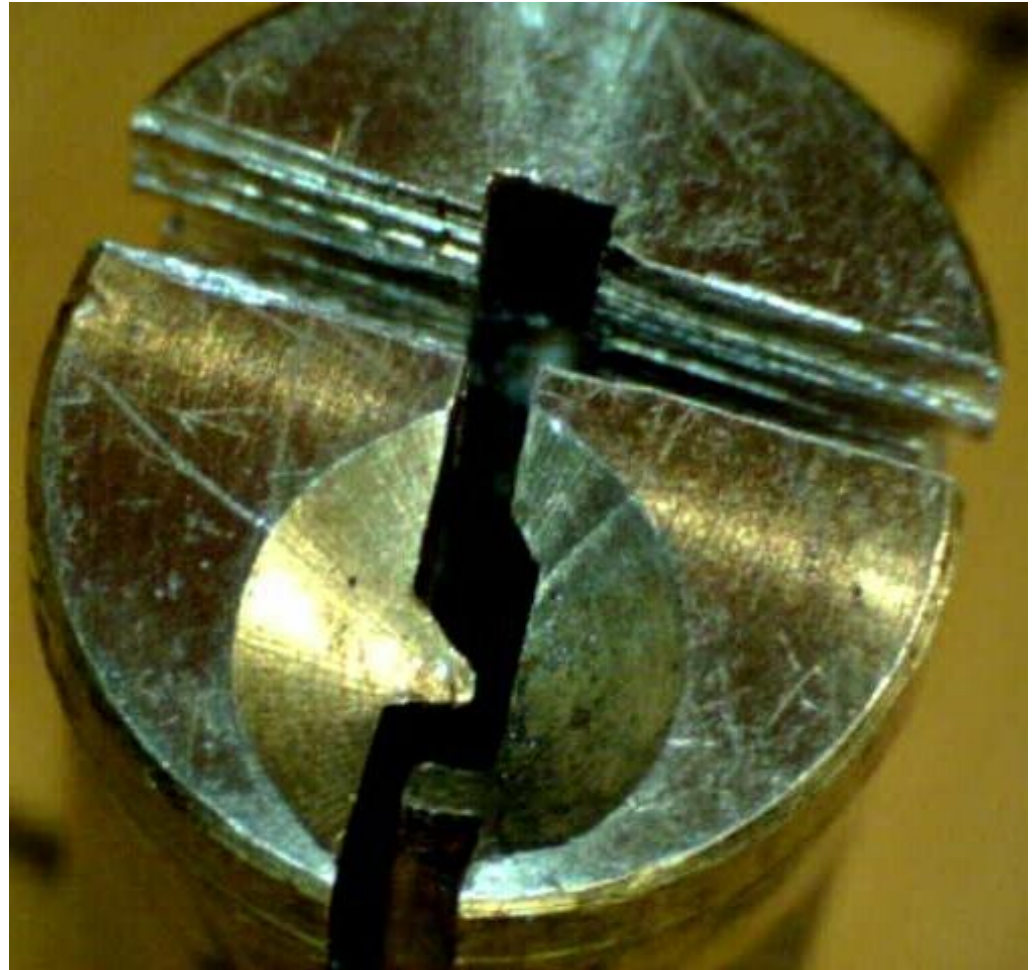
# Forensic Examination

- Lock specs & data
- Lock operation
- Lock security rating
- Tool marks
- Material transfer
- Keys
  
- Do your homework!



# Disassembly

- Chamber casings
- Use of key(s)
- Shimming
- Destructive



# Shimming



# Forensic Workspaces

- Separate!
- Clean area
- Clean/new tools
  - Tweezers, followers, shims
  - Saws
  - Clay
  - Hands/etc



# Cleaning of Components

- To clean or not?
- Always look first!
- Evidence destruction
- False evidence creation

# Cleaning of Components



# Investigative Report

- Findings
- Supporting pictures
- Mirrored locks\*
  - Picked
  - Pick gun
  - Bumped
  - Impressioned



# Licensing & Certification

- International Association of Investigative Locksmiths (IAIL)

# Resources

[www.LockpickingForensics.com](http://www.LockpickingForensics.com)

[www.LockpickingForensics.com/links.php](http://www.LockpickingForensics.com/links.php)

[www.LockWiki.com](http://www.LockWiki.com)