sonoscopic morphologies

Glossary

Glossary

The Cambridge Dictionary defines the term glossary as „an alphabetical list of difficult, technical, or foreign words in a text along with explanations of their meanings“. Within this work, the glossary serves not just as an introductory section containing a list of terms with their corresponding explanations, but rather as a substantial part with a wider understanding of its meaning not limited to words. Where necessary, it introduces speculative elements and deflects to other forms of communication where written language reaches its limits.

This glossary constellates different materials like texts, images and sounds, while also outlining conceptual positions within the work. It serves as both a form of documentation and reflection of the working process and as an echo of its practical part.

The glossary does not aspire to completeness nor to be universally valid. Rather, it defines itself through its content. It may be understood as a series of windows into a process, snapshots, inquiries and moments of discussion. It is also a collection of attempts to investigate, (re)define or (trans)form a vocabulary for the spaces in-between (or beyond) the categories of materials science and sound art.

Microscopy

148 mm

microscopic

microscopic

microscopic

microscopic

microscopic

microscopic

Microscopy

About microscopy, is also about the microscope.

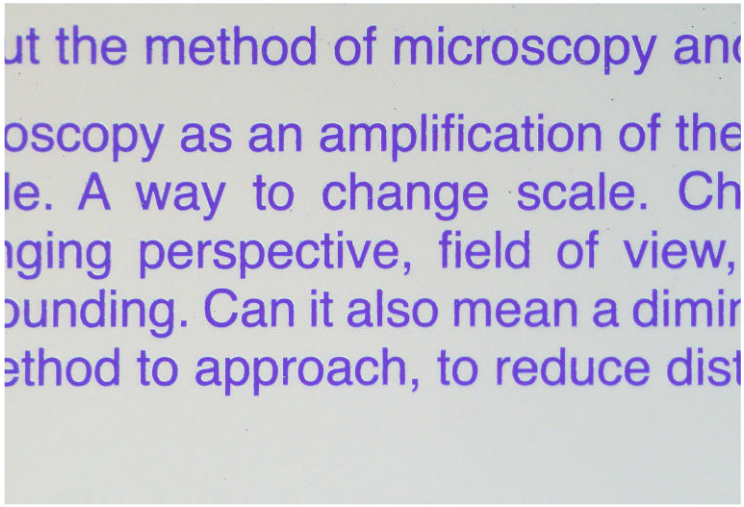
The micro - the very small or a prefix for a measure - scope - a range, or a device for looking at or discovering and measuring things (Cambridge dictionary, 2025). A device for looking at very small things or setting the focus on a very small range. To make the very small visible to the human eye.

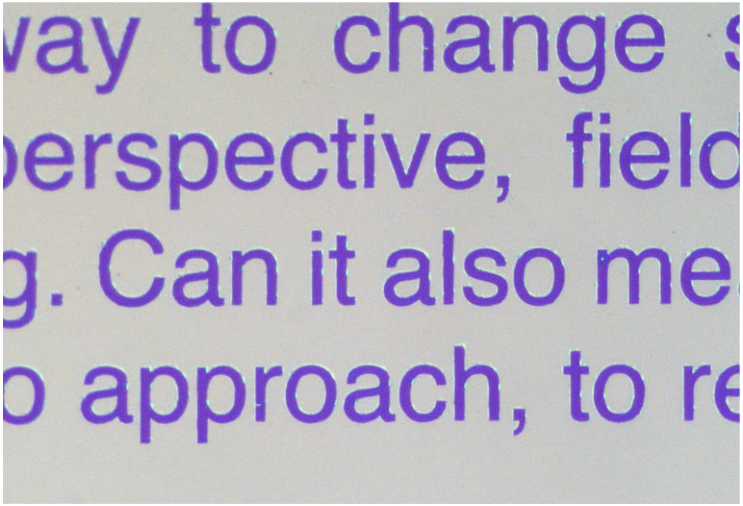
About the method of microscopy and the microscopic.

Microscopy as an amplification of the microscopic, the tiny, the subtle. A way to change scale. Changing the scale means changing perspective, field of view, distance, relation to the surrounding. Can it also mean a diminution of the self in return? A method to approach, to reduce distance, to get close?

Microscopic text I

2.9 mm





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Microscopic text II

Microscopes are instruments.

Instruments are sounding bodies.

Sounding bodies are sensors.

Sensors are microscopes.

Microscopes are sounding bodies.

Sounding bodies are instruments.

Instruments are sensors.

Sensors are sounding bodies.

Sounding bodies are microscopes.

Microscopes are sensors.

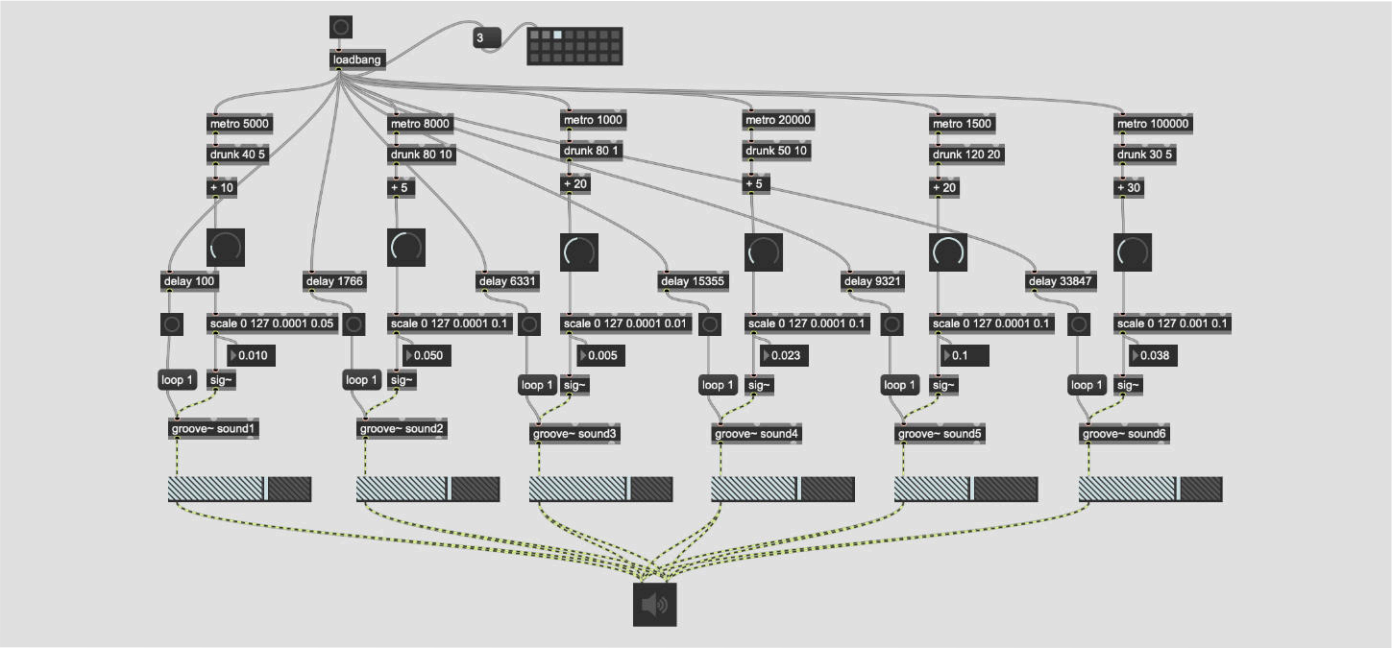
Sensors are instruments.

Instruments are microscopes.

Microscopes

Slowness as a form of microscopy | Time blender | Instrument

This polyphonic instrument (programmed with Max MSP) is based on superimposition of several layers of the same sound recording in decelerated and periodically changing playback speeds. It echoes a sonic moment and the multiplicity of its aesthetic facets, in this case the moment of fracturing of a thin layer of monocrystalline silicon.



Stille. An einem Ort sein und nichts hören. An keinem Ort sein und etwas hören. Nicht sein. Dazwischen, inzwischen, lange sein, Langeweile, allein sein, vereinzelt. Nicht allein sein beim Alleinsein. Mit Menschen sein. Sprechen, aber nichts sagen. Nah und unnahbar. Da sein. Nicht da sein. Unsichtbar, aber präsent. Sich selber hören. Etwas hören das nicht da ist. Etwas nicht hören, das da ist. Zuhören, aufmerksam, unmerksam. Versinkend, verschleiert, versickert. Unwirklich real.

Was ist Stille?

Absolute Stille, relative Stille, oder einfach Stille?
Kann es Stille geben?
In welcher Form existiert Stille?
Wie erkenne ich Stille?
Wie erkenne ich Stille, wenn ich sie nicht hören kann?
Wie erkenne ich Stille, wenn ich sie nicht sehen kann?
Wie erkenne ich Stille, wenn ich sie nicht messen kann?
Ist sie dann nicht?
Ist sie dann Nichts?
Was ist Nichts?
Wie kann ein Nichts erfahren, gemessen, nachgewiesen werden?
Ein Rauschen?
Das Rauschen eines Prozesses?
Noise?

Was bedeutet Stille?

Schwingung, mit Eigenleben?
Stille als ein eigener Organismus, bewegend, entwickelnd?
Mit einer eigenen Stimme, mit eigener Stille?

Stille | Nachweisgrenze | (dis)silence

Lab | Ecosystem | (dis)silence | Umstülpung


Struers
Struers
Bitte nur geringte
Einbettförmchen
zurücklegen !!!

Lab | Ecosystem | (dis)silence | Umstülpung

Lab | Ecosystem | (dis)silence | Umstülpung

Lab | Ecosystem | (dis)silence | Umstülpung

Soundscape

The term Soundscape was initially introduced by Michael Southworth (1969)[1] as „the quality and type of sounds and their arrangement in space and time“ in the context of studying the (human) perception of urban acoustic environments. Murray Schafer (1977)[2] significantly coined the term soundscape through his research and use of the term which led to its widespread adaption and popularization in various fields. Schafer (1977) describes the features of the soundscape as keynote sounds, signals and soundmarks and draws connections to landscape and music. To date the term Soundscape is used and adapted in various fields that go far beyond its original „human perception“ context (Mitchell, Aletta, Oberman, 2023)[3].

Focusing on the single elements of a soundscape can be seen as disassembly as a form of microscopy. The composition of soundscapes in turn as as a reassembly, or as this virtual immersive experience that takes the function of a microscope (Marcus Maeder, 2017)[4].

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[1] Sourthworth, M. (1969). The Sonic Environment of Cities. Environment and Behavior, 1(1), 49-70. URL: https://doi.org/10.1177/001391656900100104

[2] Schafer, R. M. (1977). The soundscape: Our sonic environment and the tuning of the world. Destiny Books.

[3] Mitchell, A; Aletta, F; Oberman, T & Kang, J; (2023) How do we define soundscape? In: Proceedings of the 10th Convention of the European Acoustics Association Forum Acusticum 2023. European Acoustics Association Forum Acusticum: Torino, Italy. URL: http://dx.doi.org/10.61782/fa.2023.0359

[4] Maeder, M. (Ed.). (2017). Kunst, Wissenschaft, Natur: Zur Ästhetik und Epistemologie der künstlerisch-wissenschaftlichen Naturbeobachtung. transcript Verlag.

Waves | Particles | Perspectives

As their name suggests, electron microscopes resemble the more common light microscopes, but use an electron beam instead of light for imaging. Electron microscopes have been built to overcome the physical restrictions of light and photons. Both electrons and light can be described as either particles or waves (Lindner, 2001)[5]. This concept is called the particle-wave duality. When light or electrons are described as waves, however, the radiation wavelengths of light are thousands of times larger than the radiation wavelengths of electrons (Egerton, 2016)[6]. Therefore, electron microscopes can image smaller structures and achieve much higher magnifications than light microscopes.

When referring to light in the context of microscopy, visible light is usually meant, the part of the spectrum to which the human eye is sensitive. In light microscopic images, colors are also depicted. In electron microscopy there are no colors. However, there are detectors that can depict variations in chemical composition of the materials. This is called compositional contrast or material contrast (Scheu und Kaplan, 2012)[7].

Both technologies, electron and light microscopy, have their strengths. They represent different perspective shifts. Each perspective can bring additional insights, but also with limitations in other aspects. Are there ever enough perspectives?

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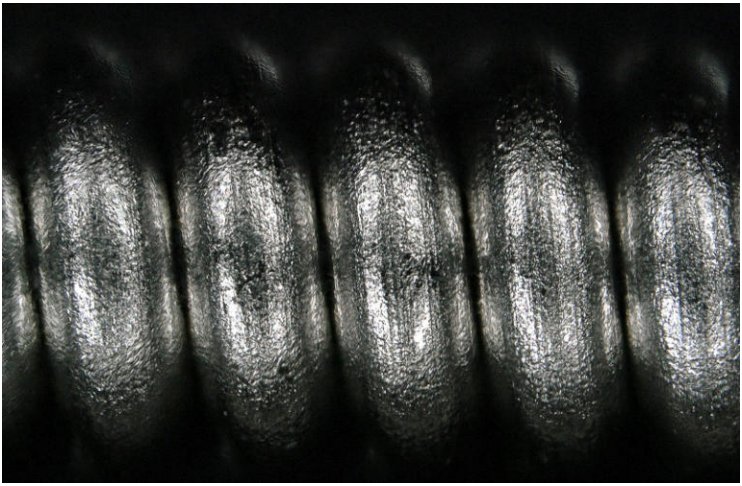
[5] Lindner, H. (2001). Physik für Ingenieure (16. Aufl.). Carl Hanser Verlag

[6] Egerton, R. F. (2016). Physical principles of electron microscopy: An introduction to TEM, SEM, and AEM (2nd ed.). Springer.

[7] Scheu, C., & Kaplan, W. D. (2012). Introduction to scanning electron microscopy. In G. Dehm, J. M. Howe, & J. Zweck (Eds.), In-situ electron microscopy: Applications in physics, chemistry and materials science (pp. 1–20). Wiley-VCH. https://doi.org/10.1002/9783527641871.ch1



Disassembly as a form of microscopy

Method: Digital microscopy

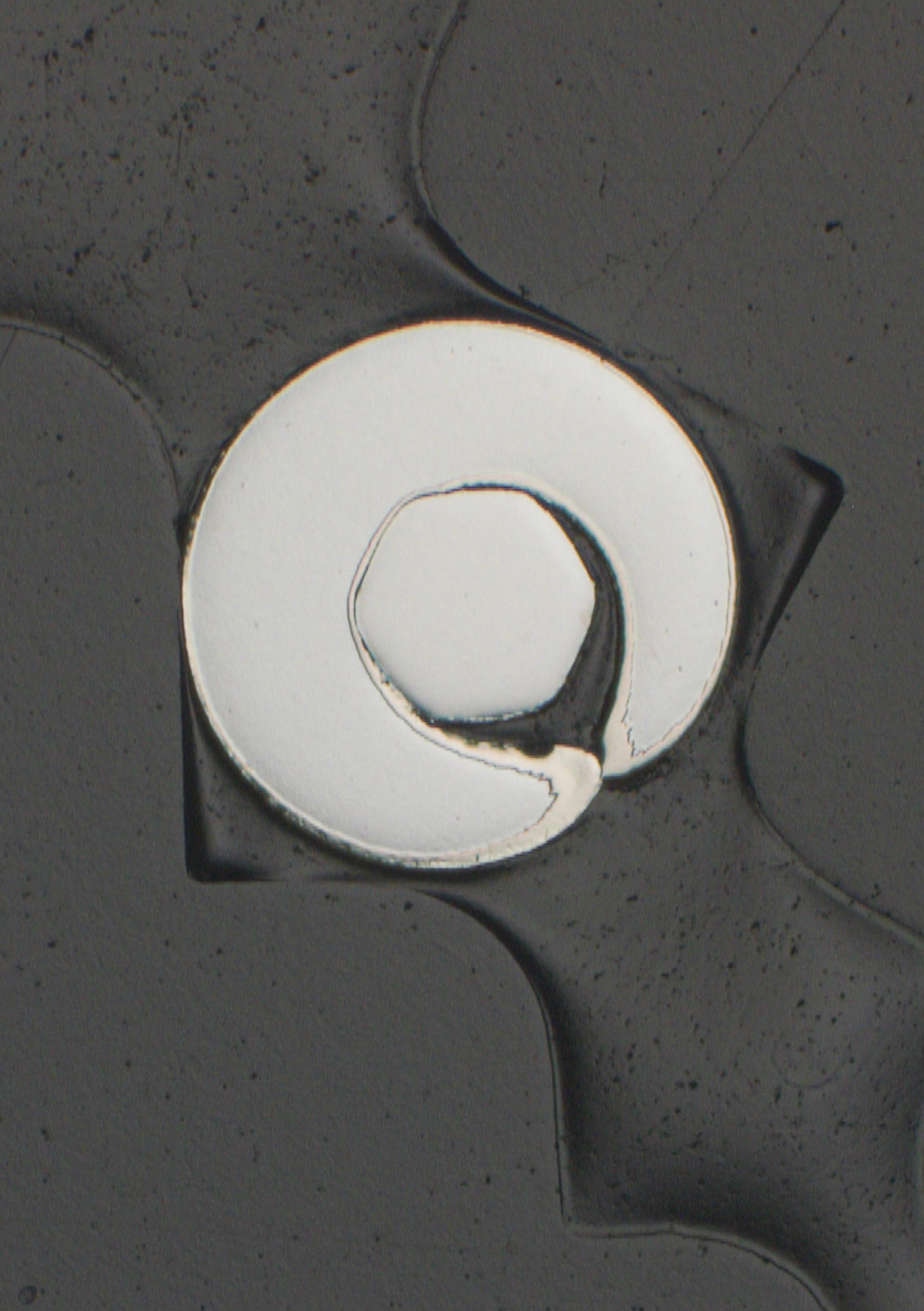
Instrument: Digital microscope - Keyence VHX-X1

Sample: Low E-string for e-guitar

17.5 mm

1.75 mm

0.175 mm



Disassembly as a form of microscopy

Method:	Reflective light microscopy
Instrument:	Optical light microscope - Zeiss Axio Imager.M2m
Sample:	Low E-string for e-guitar
Preparation:	SiC grinding (180, 600, 1200, 2500, 4000) Polishing: 3 µm and 1 µm diamond emulsion, colloidal silica suspension

1.4 mm

Disassembly as a form of microscopy

Method:	Reflective light microscopy
Instrument:	Optical light microscope - Zeiss Axio Imager.M2m
Sample:	Low E-string for e-guitar
Preparation:	SiC grinding (180, 600, 1200, 2500, 4000) Polishing: 3 µm and 1 µm diamond emulsion, colloidal silica suspension Etching solution: V2A

0.16 mm

Take a breath,

a deep breath.

Feel the silence in your lungs.

Explore it.

Take your time.

How does it taste?
How is its texture?
What color does it have?

Now breathe out slowly.

Slowly and deeply.

Hear its viscosity.

The silence in your lungs streaming out.

Dissipating.

How does it feel to let go of it?
What is it that remains?
Do you recognize it?

Follow it with your eyes.

Does the shade of its color change?
Where does it go?
How does the shape of its body unfold?
How does it move?
Can you feel it on the skin of your fingertips?

Try to taste it with your ears.

Can you taste its color?
Do you recognize its surface?
Does it transform with time?
How would you describe it?
Can you hear where it will go?

Will you remember it -

this silence?

Silence

Sonosocopic morphologies

In scanning electron microscopy, there is always a certain penetration of the electrons into the sample material. The higher the acceleration voltage of the electron beam, the deeper the penetration (Egerton, 2016)[8]. As a result, not only the surface of the sample is imaged, but also a part of the material below.

Thinking beyond this technology and transferring it metaphorically, it is a form of microscopy that engages both with the surface and the material within.There is no surface to separate the inside from the outside. It depicts the in-between. Hearing the echoes from surfaces and simultanously the resonance from within. As another perspective. As inversion (Umstülpung). A fusion of topology and morphology. What morphology? Sounding morphologies? Microscopic morphologies? Sonoscopic morphologies?

[8] Egerton, R. F. (2016). Physical principles of electron microscopy: An introduction to TEM, SEM, and AEM (2nd ed.). Springer.

(forms of) microscopy

Forms of microscopy are ways of thinking microscopy beyond its initial scientific-technological applications. It is about investigating the method of microscopy and its potential to shift perspective, focus on the subtle and embrace complexity. In (re)search for new questions, rather than answers, or to ask questions as an answer.

DIY contact microphone | DIY microscope

Piezo-element, 10 mm diameter

Polycarbonate housing

Steel nail

Cupper shielding

Silicone sealing

Instrument cable

Jack plug

DIY hydrophone | DIY microscope

Piezo-element, 20 mm diameter

Aluminium tube

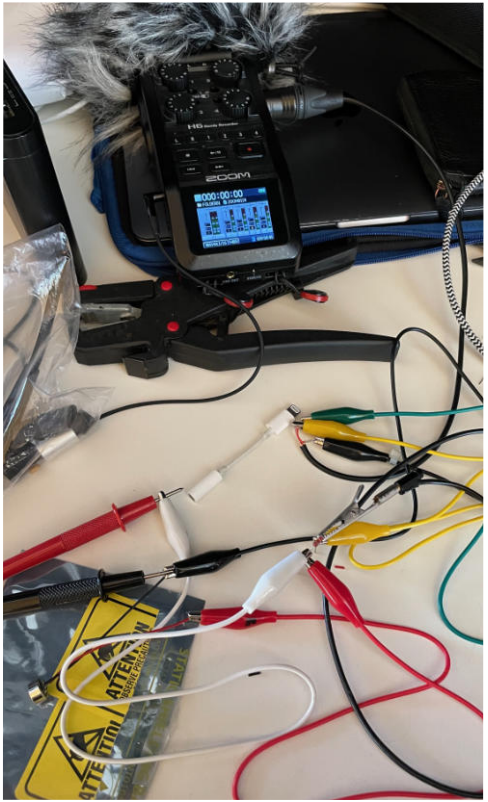
Steel washers, 18 mm diameter

Silicone sealing

Liquid rubber sealing

Instrument cable

Jack plug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H6
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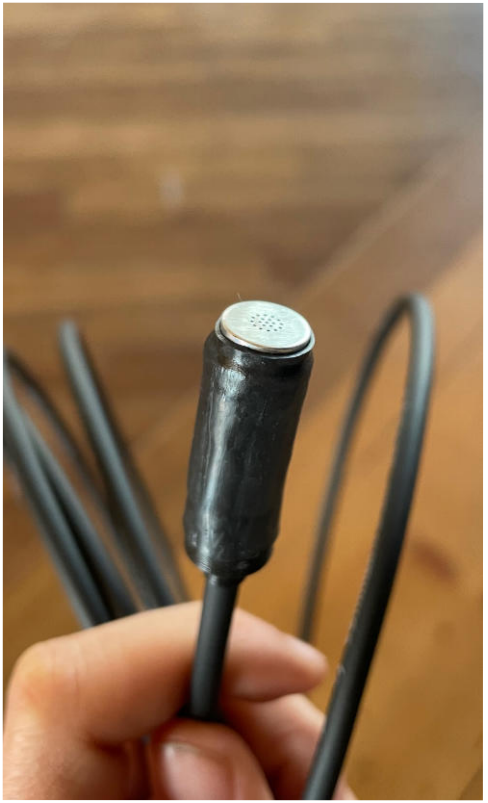


DIY microphone | DIY microscope

Electret microphone capsule

Capacitor

Resistor

3D printed PLA housing

Shrinking tube

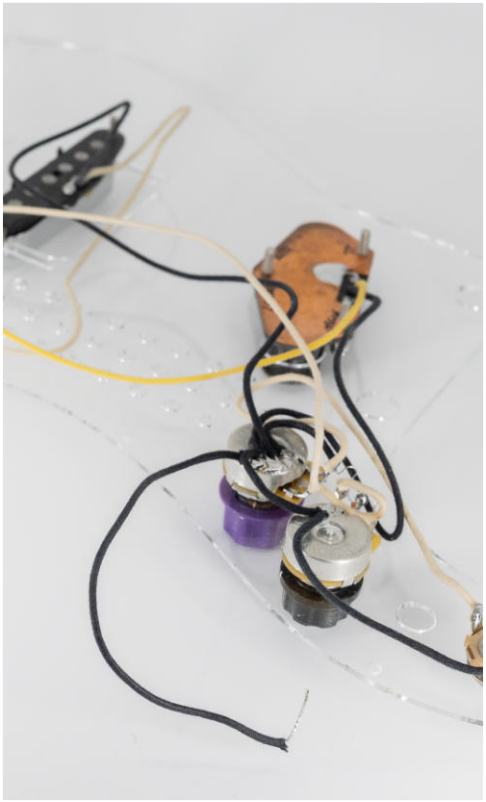
Windprotector

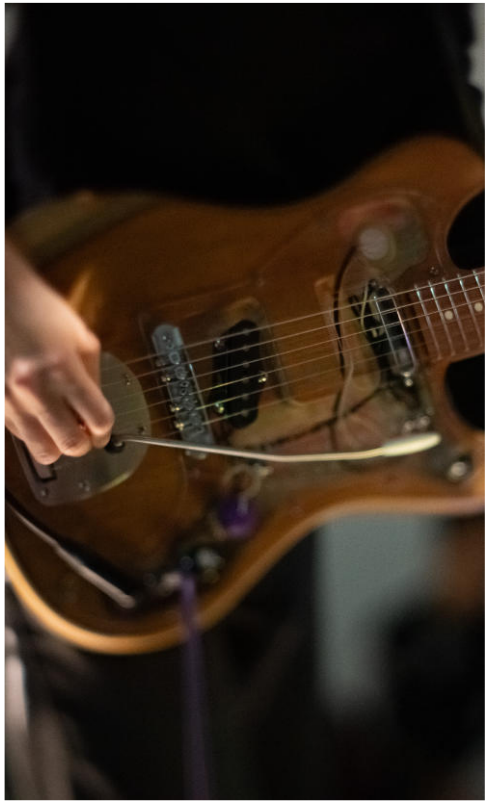
2-wire instrument cable

XLR plug

Phantom power


BESSEY





DIY guitar | DIY microscope

Wood from a former piano

Body microphone, piezo-element, 35 mm diameter

Suhr Classic T neck pick-up, single coil

Lollar Special T bridge pick-up, single coil

External sensor jack input for contact microphones, hydrophones, ecetromagnetic microphones, and others

3-way switch

2x on-off toggle switch

Mastery bridge

Jack output

D'Aaddario guitar strings

Complexity

When I was first introduced to the electron microscope, I was absolutely blown away by the intricate layers of complexity in materials - new layers that I had been unaware of until then.

I was 16 years old.

Having this extraordinary instrument at my fingertips was an incredible privilege.

I still miss these days, weeks, months, years, where I had this proximity and access.

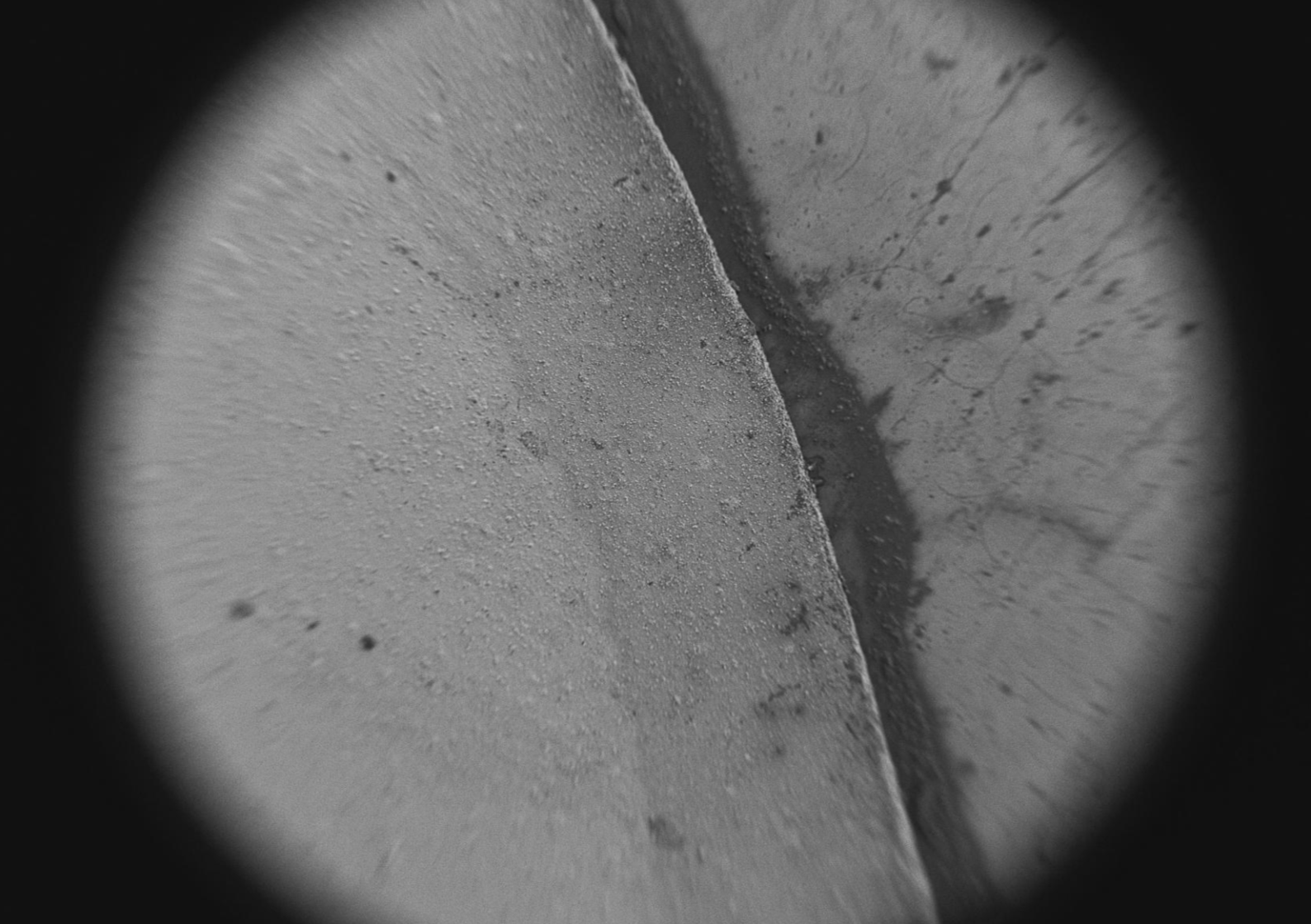
Spending that much time in these scales left a lasting imprint.

Sometimes, when looking at a surface, I imagine how it would look like under the microscope.

Imagining that every surface has at least this level of complexity is overwhelming.

Survival of the loudest.

Silence



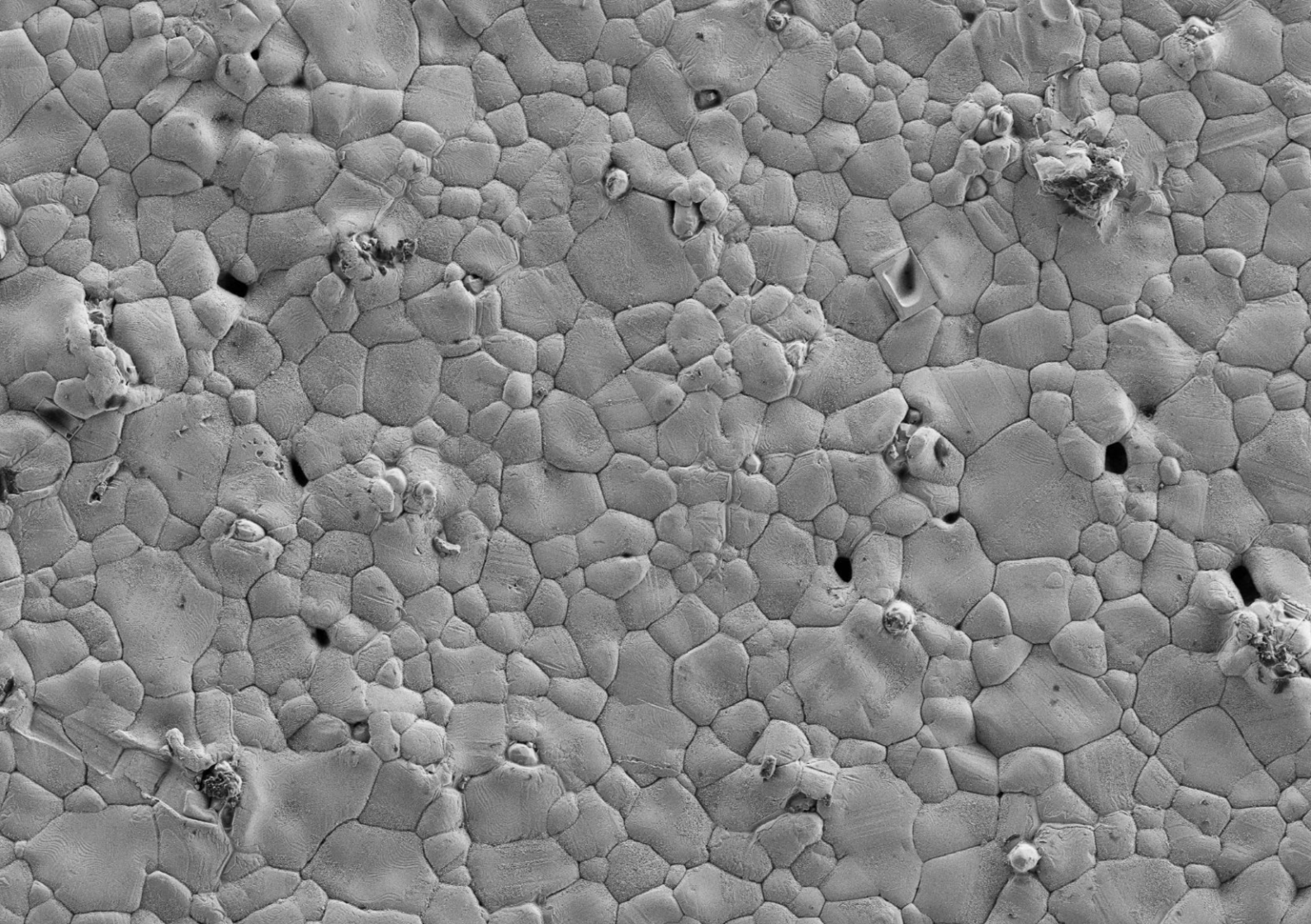
Microscopy | Amplification | Limit of detection I

Method: Electron microscopy

Instrument: Electron microscope - Zeiss Gemini Spura 55 VP

Sample: Piezo-element, 15 mm diameter

3.6 mm



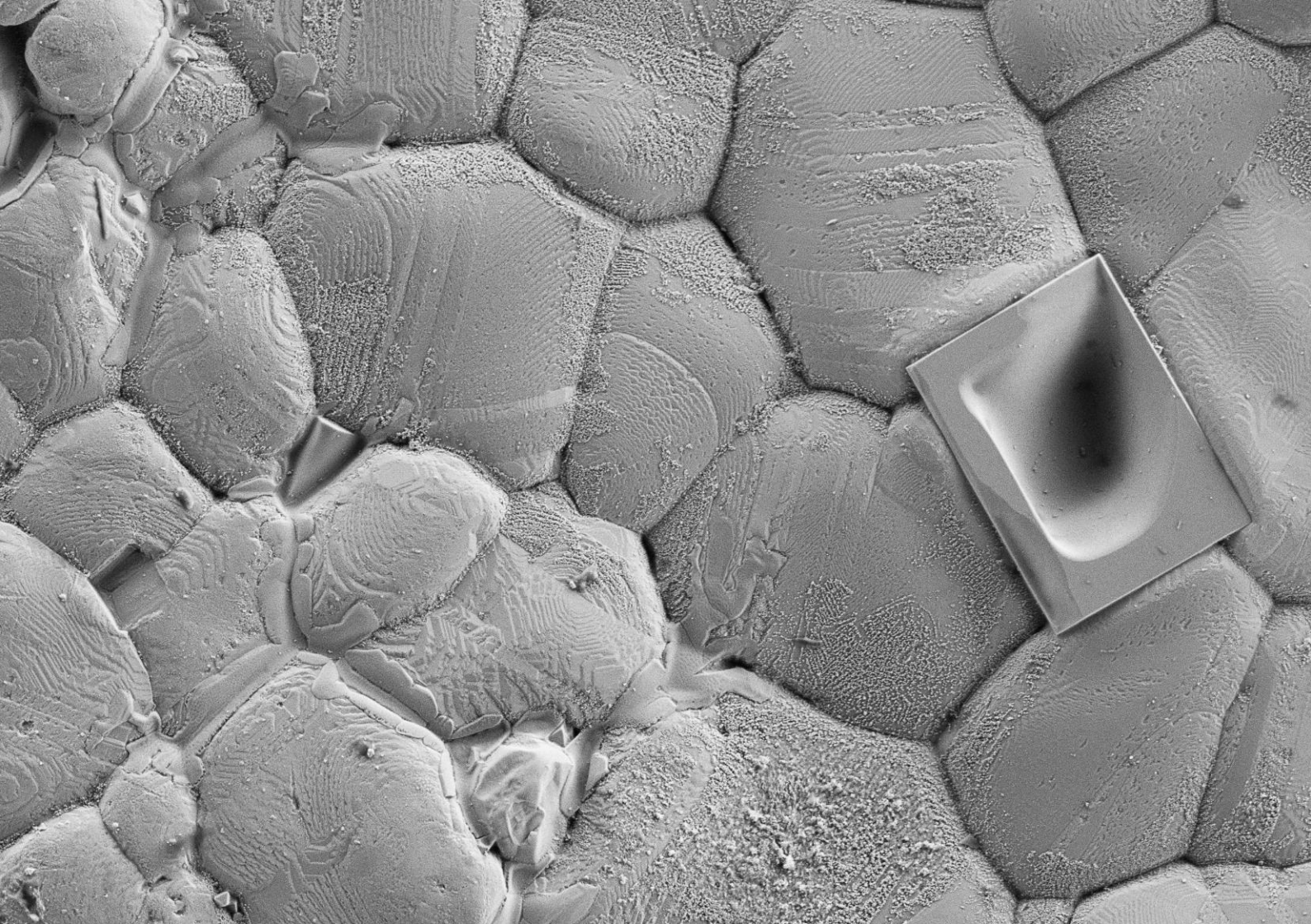
Microscopy | Amplification | Limit of detection II

Method: Electron microscopy

Instrument: Electron microscope - Zeiss Gemini Spura 55 VP

Sample: Piezo-element, 15 mm diameter

0.09 mm



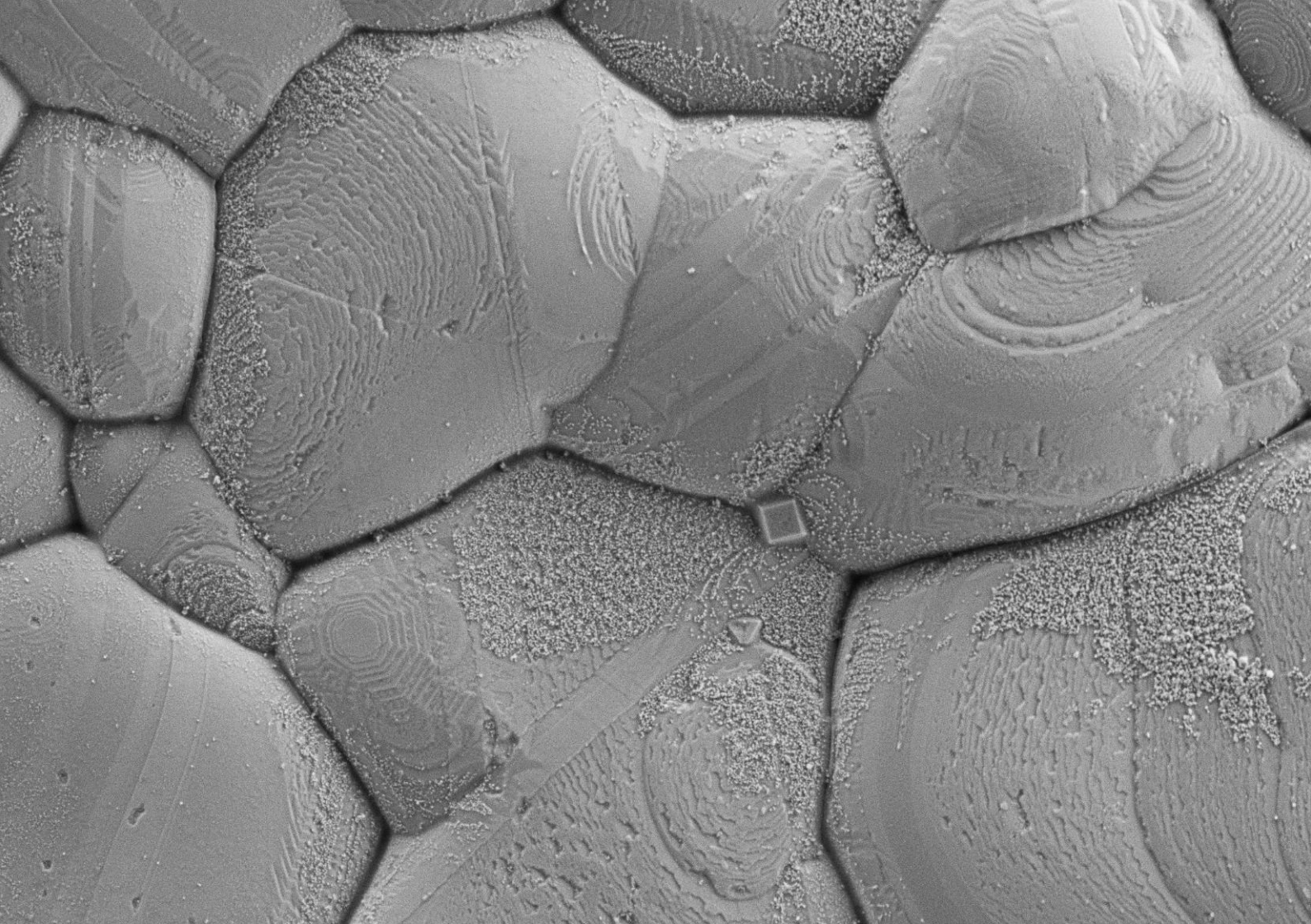
Microscopy | Amplification | Limit of detection III

Method: Electron microscopy

Instrument: Electron microscope - Zeiss Gemini Spura 55 VP

Sample: Piezo-element, 15 mm diameter

0.018 mm



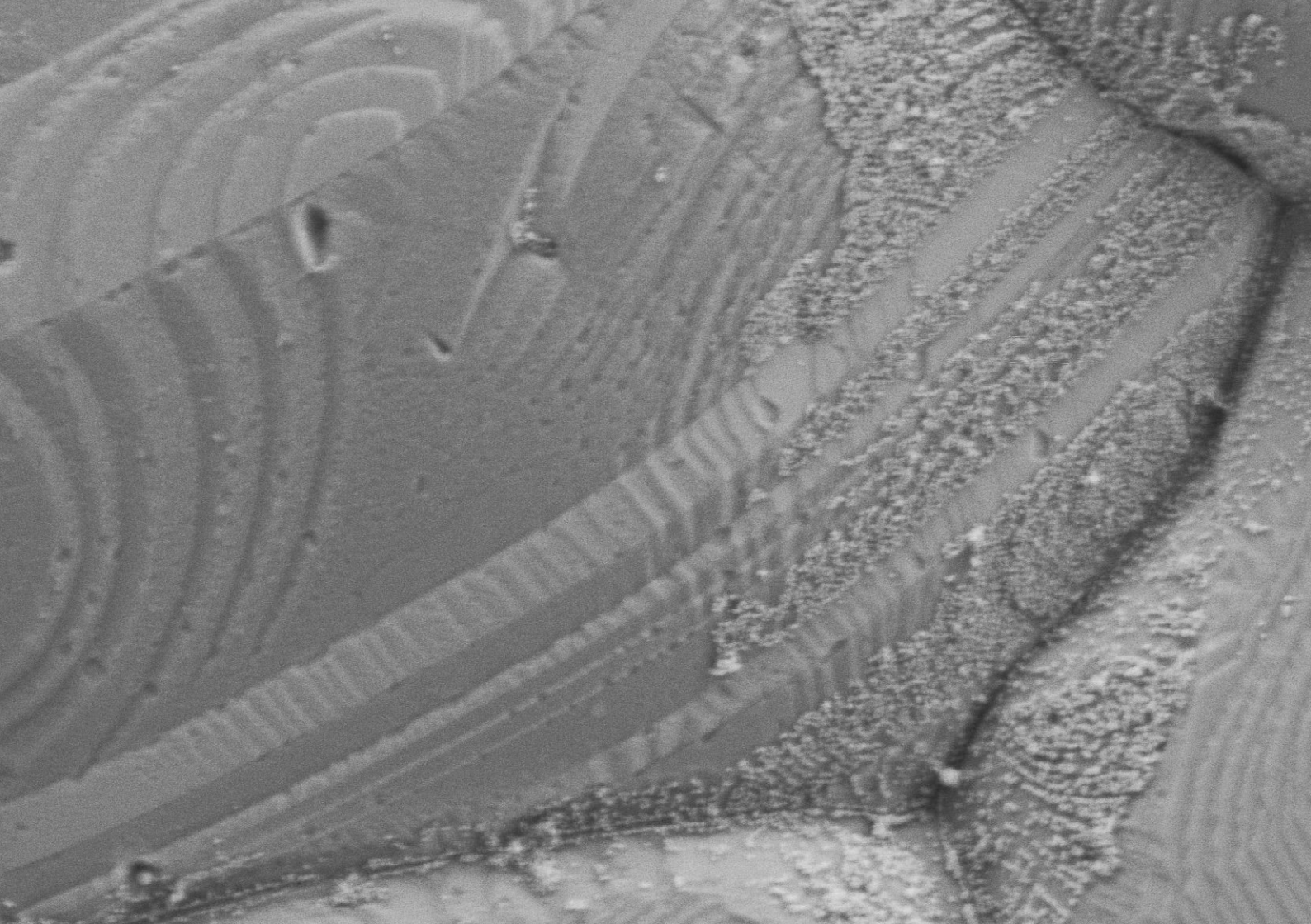
Microscopy | Amplification | Limit of detection IV

Method: Electron microscopy

Instrument: Electron microscope - Zeiss Gemini Spura 55 VP

Sample: Piezo-element, 15 mm diameter

0.009 mm



Microscopy | Amplification | Limit of detection V

Method: Electron microscopy

Instrument: Electron microscope - Zeiss Gemini Spura 55 VP

Sample: Piezo-element, 15 mm diameter

0.0045 mm

Microscopy | Amplification | Limit of detection VI

Method: Electron microscopy

Instrument: Electron microscope - Zeiss Gemini Spura 55 VP

Sample: Piezo-element, 15 mm diameter

0.0009 mm

Microscopy | Amplification | Limit of detection VIII

Method: Electron microscopy

Instrument: Electron microscope - Zeiss Gemini Spura 55 VP

Sample: Piezo-element, 15 mm diameter

0.00009 mm

Silence as a form of microscopy | (dis)silence

Method: Silence as aform of microscopy

Instruments: DIY guitar, piezo-element
Guitar effects (Empress Reverb, Neunaber Wet Reverb, Boss RV-6 Reverb, Strymon Volante Delay/Echo/Reverb, Golden Brownie Distortion)

I am part of the instrument.

The instrument is part of me.

I am part of the sensor.

The sensor is part of me.

I am part of the sounding body.

The sounding body is part of me.

I am part of the microscope.

The microscope is part of me.

Instruments

Umstülpen | Perspektivenwechsel | Mikroskopieren

Der Prozess des Umstülpens begann aus einer tiefen Unruhe. Eine Unruhe, die alles in Bewegung setzte. Vermutlich begann er bereits weit davor, doch wurde er noch nicht als solcher erkannt - als ein Prozess, der unaufhaltbar, ständig in Bewegung ist, sich durchs Unterbewusstsein schlängelt, aufwühlt, verwirbelt und neues sedimentieren lässt, nur um vom Sog der Umstülpung wieder mitgerissen und neu angeordnet zu werden.

Vielleicht handelt es sich nicht nur eine Umstülpung, sondern auch um eine Art Zurechtbiegen einer nicht existierenden, aber etablierten Realität oder einer nicht etablierten aber existierenden Realität. Es kann auch eine Rückstülpung sein, die ein neues Inneres hervorbringt, denn es kann ebenso sein, dass dies nicht die erste ist, sondern eine von vielen bereits stattgefundenen.

Wie definiert sich dieses Innere und Äussere? Ist eine Unterscheidung von Innerem und Äusserem in diesem Zusammenhang überhaupt sinnvoll? Dann müsste es eine Art Grenze geben, eine Trennung, eine Haut, eine Oberfläche. Eine Grenze, an der sich die Umstülpung orientiert. Wird diese Grenze erst durch den Prozess des Umstülpens definiert? Unterscheiden sich die Eigenschaften und die Materialität dieser Grenze von ihrer Umgebung? Ist es eine Inhomogenität, an der eine Trennung stattfindet? Wie findet die Trennung statt? Ist diese Trennung gleichzeitig eine Ruptur, eine Verletzung, eine Schädigung - oder eine Befreiung, eine Eröffnung von Möglichkeiten, ein Potential? Oder ist es alles zugleich? Vulnerabilität als Ursprung und gleichzeitig als Resultat?

Aus Sicht des Materials und der Materialprüfung betrachtet, legt die Ruptur, der Bruchausgangspunkt, eine Schwachstelle offen. Eine Schwachstelle, die bei der Analyse der Bruchfläche in den Fokus kommt und eine zentrale Rolle einnimmt. Doch diese Stelle ist eigentlich keine Schwäche, sondern ein Potential - ein Potential, das den Prozess der Ruptur unter einer bestimmten Last beschreiben lässtt. Es ist die entscheidende Stelle im Material.Sie legt die Mechanismen, die zur Ruptur und der Bildung neuer Oberflächen und Topologien führten, offen, und macht sie dadurch zugänglich.

Die Stelle, an der das Material der Belastung nicht mehr standhalten kann, zur Deformation führt, bis zum vollständigen Versagen und zur Trennung, je nach Eigenschaften des Materials mehr oder weniger plötzlich, legt vorher nicht da gewesene Oberflächen frei. Diese Oberflächen, die davor im Inneren schlummerten, oder gar nicht erst existierten, können beispielsweise mit mikroskopischen Methoden untersucht und charakterisiert werden.

Wie aber kann eine solche Oberfläche, die vorher noch nie gesehen worden ist, charakterisiert werden? Benötigt sie nicht ein Vorwissen, anhand dem das Beobachtete eingeordnet und kategorisiert werden kann? Kriterien, die eine Einordnung zulassen? Was wäre, wenn die Oberfläche etwas noch nie Wahrgenommenes offenbart? Etwas Unbekanntes, das die Regeln bisheriger Kategorisierungen befragt, anstatt von ihnen befragt zu werden?

Bei elastischen Materialien ist auch eine Umstülpung ohne Trennung denkbar, ebenso eine Teil-Umstülpung, bei der ein Teil des Inneren innen bleibt und ein Teil in eine neue Umgebung überführt wird. Dabei werden Teile der Struktur stärker belastet als andere. Dafür sind Interaktionen mit einer neuen Umgebung möglich, die den interagierenden Teil der Oberfläche nachhaltig verändern, auch wenn sich die vorher innen befundene Oberfläche wieder zurück ins Innere stülpt (falls das Innere dann immer noch als solches identifiziert werden kann). Obwohl bei der Teil-Umstülpung auch immer eine resultierende Kraft zur Rückstülpung bestehen bleiben kann, ist eine Umstülpung doch nie vollständig reversibel.

Eine Umstülpung erlaubt und verkörpert Perspektivenwechsel. Wird die Methode der Mikroskopie als Perspektivenwechsel und Möglichkeit zum Einnehmen neuer Perspektiven betrachtet, wird Mikroskopie zu einer Art der Umstülpung oder Teil-Umstülpung. Somit kann Mikroskopie einerseits Initiantin und gleichzeitig Untersuchungsmethode ihrer selbst werden. Eine Mikroskopie der Miksorskopie. Wird die mikroskopierende Person dabei Teil des Mikroskops, Teil des initiierenden Moments, der Untersuchungsmethode und des zu untersuchenden Materials?

Instrument | Microscope | Sensor | Sounding body

Listening as a form of microscopy | Soundscape

Materials you need:

- Headphones
- Phone (or another device that allows to record audio)
- 15 minutes time

Take one minute to find a place that inspires you.

Take your phone in your hand and start to record sound.

Walk for 5 minutes, listen to the space, explore the space, with your ears, with your (micro)phone.

Try to activate all of your senses to explore the space and its voice(s) and yourself within it.

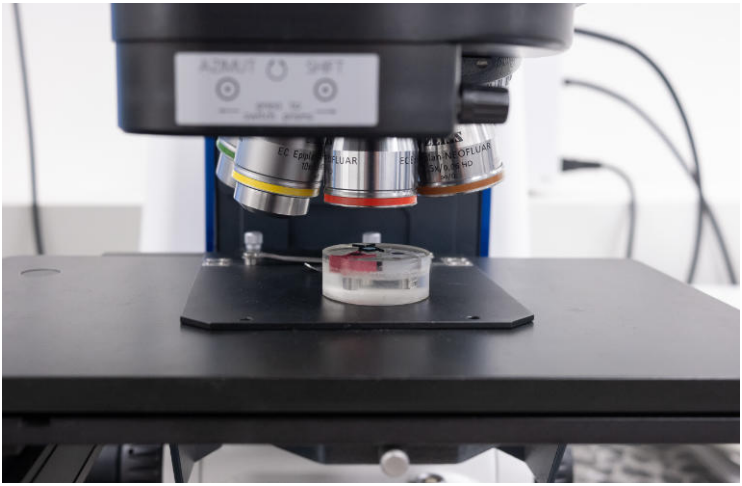
Stop the recording and go back to your starting point.

Listen closely to your recorded journey and try to walk the same path again while listening.

What has changed?

What hasn't changed?

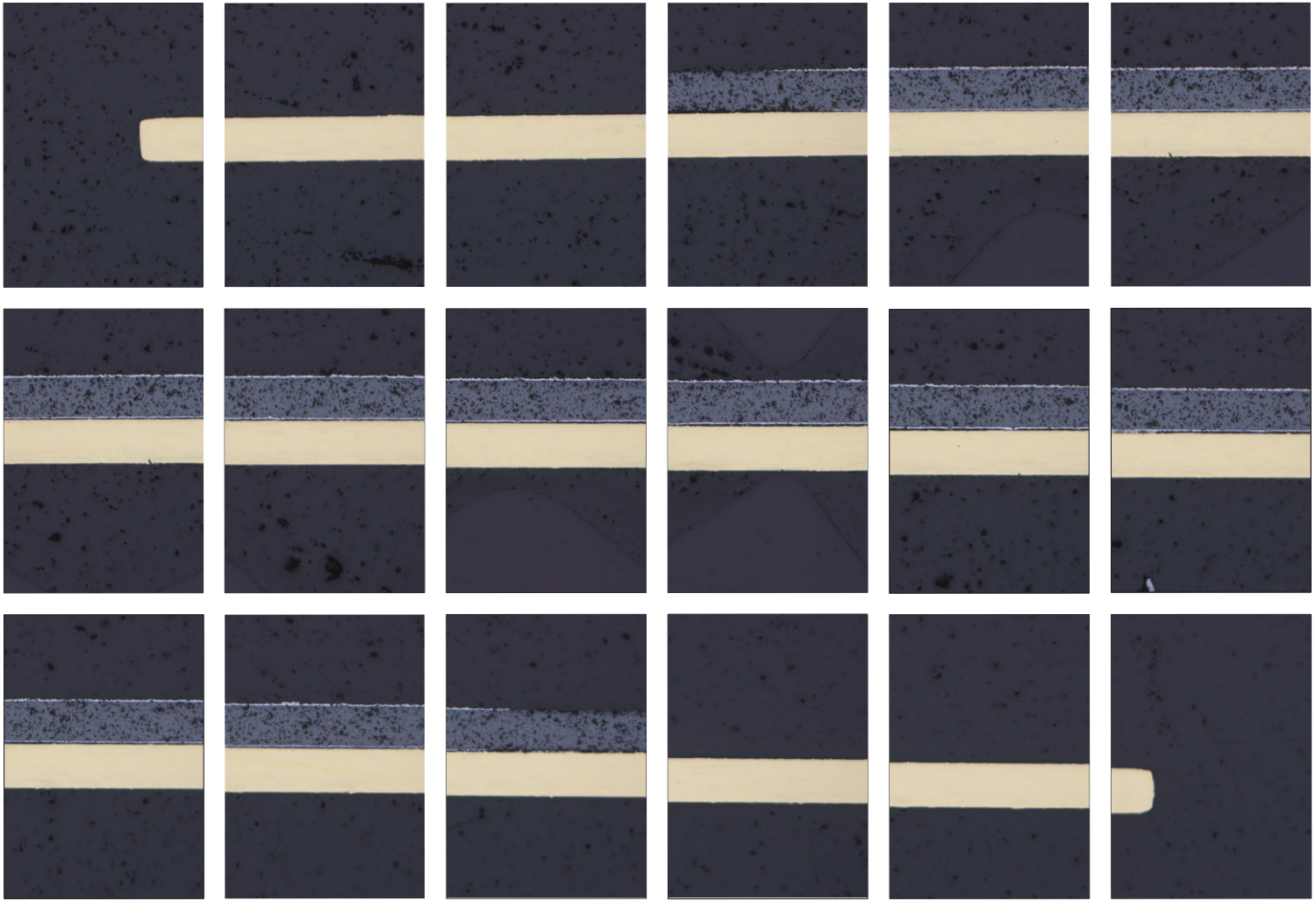
How did you contribute to the soundscape?



Metallographic cross sectioning

How would the world look like, if we could also sense _____?

Limit of detection



Piezo-element | cross section

Method:	Reflective light microscopy
Instrument:	Optical light microscope - Zeiss Axio Imager.M2m
Sample:	Piezo-Element, 15 mm diameter
Preparation:	SiC grinding (600, 1200, 2500, 4000)
	Polishing: 3 µm and 1 µm diamond emulsion, colloidal silica suspension

6.4 mm

Proximity-Effekt

Unter dem Begriff Proximity-Effekt werden je nach Kontext unterschiedliche Phänomene verstanden. In den Materialwissenschaften kann der Proximity-Effekt unter anderem als das Auftreten von supraleitenden Eigenschaften in nicht-supraleitenden Materialien bezeichnet werden, die im elektrischen Kontakt mit einem Supraleiter stehen (Pannetier & Curtois, 2000)[9]. Man könnte es vereinfacht als das Übernehmen von Eigenschaften eines Materials von einem mit ihm in Kontakt stehenden Material verstehen, wobei „in Kontakt stehend" auch in „extrem nah sein" übersetzt werden kann. Im Kontext von Schadstoffen wird der Proximity-Effekt als ein erhöhtes Risiko eines negativen Einflusses besonders in der Nähe der Schadstoffquelle diskutiert, bei dessen Quantifizierung in Innenräumen auch die Durchmischung der Umgebung berücksichtigt werden sollte (McBridge et. al)[10]. Im Zusammenhang mit Mikrofonie und Tontechnik wird der Proximity-Effekt Nahbesprechungseffekt genannt. Damit ist eine Verzerrung des Klangbilds hin zu tieferen Frequenzen bei Schallquellen gemeint, die sich sehr nahe an der Mikrofonmembran befinden (Dickreiter et. al, 2014)[11]. Es geht also immer um den Einfluss von Nähe, mit oder ohne physischem in Kontakt treten.

Ludwig Berger (2024)[12] umschreibt ihn auch als Gegenpol zum „God-Trick" (Donna Haraway, 1088)[13], zur vom Individuum losgelösten, distanzierten Perspektive im grossen Massstab, die bei der Aufnahme des Klangbilds einer bestimmten Landschaft häufig eingenommen wird. Dabei gehen subtile Klänge im Gesamtbild unter, da sie in dieser standardisierten Hörposition von anderen Klängen maskiert, übertönt, werden. Um sie hörbar zu machen kann entweder der Abstand reduziert werden, durch

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[9] Pannetier, B., & Courtois, H. (2000). Andreev reflection and proximity effect. Journal of Low Temperature Physics, 118(5–6), 599–615. https://doi.org/10.1023/A:1004635226825

[10] McBridge, S., Ferro, A., Ott, W. et al. (1999). Investigations of the proximity effect for pollutants in the indoor environment. J Expo Sci Environ Epidemiol 9, 602–621. https://doi.org/10.1038/sj.jea.7500057

[11] Dickreiter, M., Dittel, V.,Hoeg, W., Wöhr, M. (Hrsg.). (2014): Handbuch der Tonstudiotechnik. 8., überarbeitete und erweiterte Auflage, 2 Bände. Berlin/Boston: De Gruyter.

[12] Berger, L. (2024). Der Proximity-Effekt. INSERT. artistic practices as cultural inquiries, 5, sich verlandschaften – in relationalen Praktiken. https://doi.org/10.5281/zenodo.10607578

[13] Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. In: Feminist Studies Vol. 14, No. 3, S.575–599.

Platzierung des Mikrofons, was das Einnehmen einer anderen Hörposition und damit einer anderen Perspektive bedeutet. Je nach Mikrofon werden trotz der nahen Positionierung auch Umgebungsklänge und vom Mikrofon aufgenommen, nur eben steht der Klang des Nahen im Fokus und generiert damit ein Gefühl der Intimität, das in der Mikrofonierung von Instrumenten teils bewusst eingesetzt wird. Die räumliche Nähe verändert somit nicht nur die Klangqualität, sondern auch die Wahrnehmung und ermöglicht damit ein anderes Begegnen (Encounter), in Beziehung treten zur Umgebung und zum aufgenommenen Material.

Ludwig Berger (2024) verbindet im Kontext des Fieldrecordings den Proximity-Effekt aus der Tontechnik mit dem sozialwissenschaftlichen Proximity-Effekt. Während der Proximity-Effekt in der Tontechnik beschreibt, wie räumliche Nähe zwischen Mikrofon und Klangquelle den Klang voller und grösser erscheinen lässt und damit die Wahrnehmung des Massstabs verändert, erklärt der sozialwissenschaftliche Proximity-Effekt, dass räumliche Nähe zwischen Menschen Sympathie und persönliche Beziehungen fördert.

Die physische und wahrgenommene Nähe zum Klangobjekt beeinflusst nicht nur den Klang selbst, sondern auch die emotionale Beziehung und das Erleben des Aufnehmenden zur Klangquelle und Umgebung. So entsteht durch Nähe sowohl ein veränderter Klang als auch eine intensivere, persönlichere Verbindung zum Gehörten.

Eine ähnliche Dynamik lässt sich in der Mikroskopie sehen. Die Methodik der Mikroskopie erlaubt es Perspektiven zu wechseln, in einen anderen Massstab zu gelangen, mit den Sinnen Nähe zu gewinnen. So werden subtile Strukturen und Topologien erlebbar, die ansonsten unbeachtet blieben und es kommen neue Ebenen der Komplexität hinzu. Kann mit Mikroskopie somit auch Intimität generiert werden? Hat Mikroskopie auch das Potential eine neue Nähe und Verbundenheit zu Materialien, zu Topologien zu fördern?

Forms of microscopy | Entity

Methods: Silence, listening, disassembly and slowness as forms of microscopy

Instruments:
Audio Recorder - Zoom H6
Stereo microphone capsule - XYH-6
DIY electret microphone
DIY hydrophone, piezo-element 20 mm
DIY hydrophone, piezo-element 15 mm
DIY contact microphone with nail, piezo-element 10 mm
DIY contact microphone - piezo element 20 mm, sealed
Geophone - Lom Géofon
Wildlife recorder - Wildlife acoustics SM-Mini

Dis-assembling, un assembling, undo assembling.

Taking apart, taking a part. Dissecting. Deconstructing?

D i s a s s e m b l y

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Disassembly

Instrument | Microscope | Sensor | Sounding body

Methods:	Explorative soundscapes, sound microscopy
Instruments:	Body microphone, piezo-element, 35 mm diameter Suhr Classic T neck pick-up, single coil, Alnico 5 magnets Lollar Special T bridge pick-up, single coil, Alnico 5 magnets External sensor input for contact microphones, hydrophones, ecetromagnetic microphones, and others
Samples:	Explorative soundscapes, (dis)silence
Preparation:	Adding guitar effects Sound processing Composing


gemini
VPSE
ZEISS
SUPRA 55VP

Instrument | Microscope | Sensor | Sounding body

Methods: Electron microscopy, sound microscopy

Instruments: Electron microscope - Zeiss Gemini Spura 55 VP
Audio recorder - Zoom H6
Stereo microphone capsule - XYH-6
Geophone - LOM Geofón
Electromagnetic microphone - Monacor AC-71
DIY contact microphone - Piezo-element, 20 mm, sealed
DIY contact microphone - Piezo-element, 15 mm

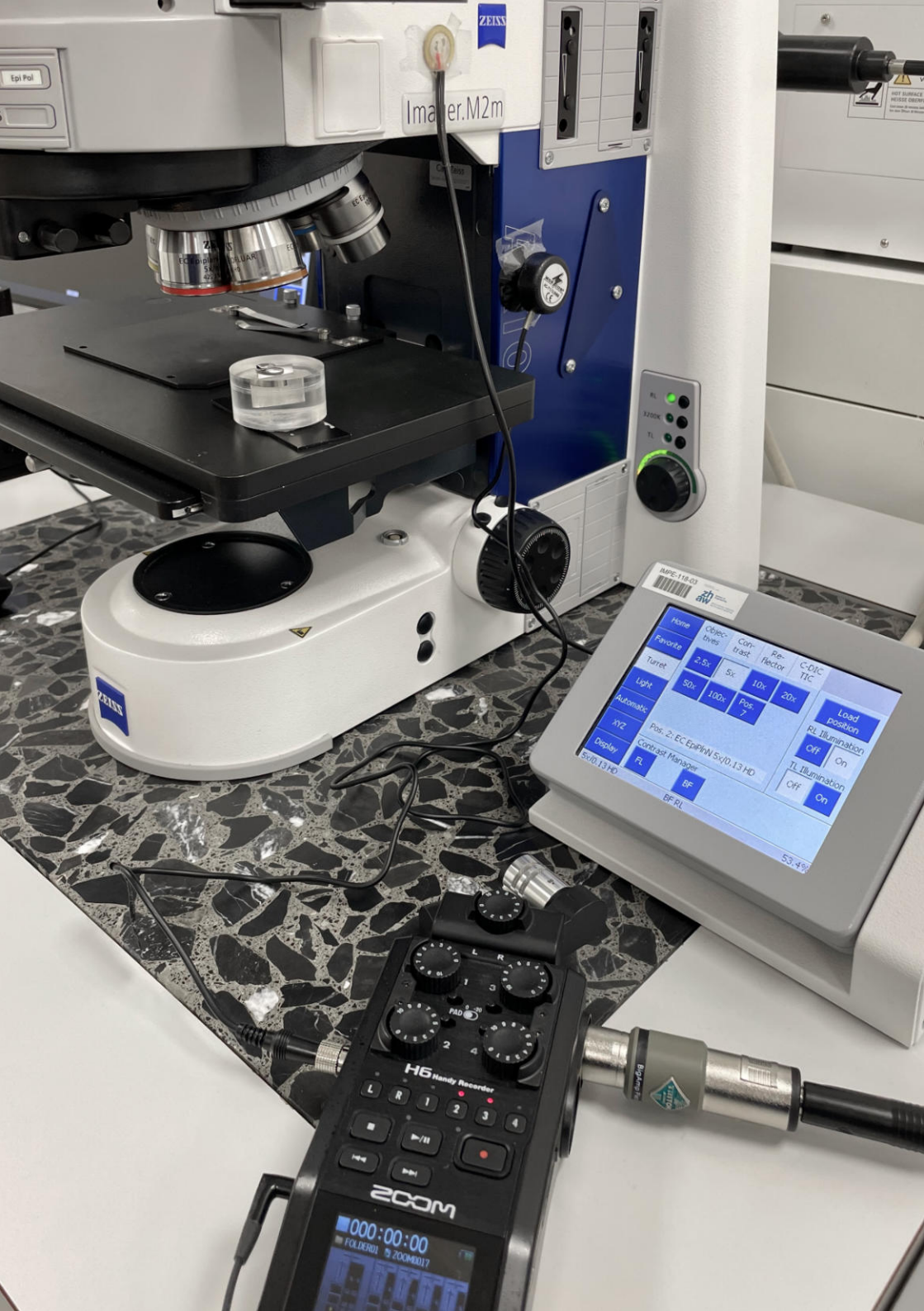
Sample: Piezo-Element, 15 mm diameter

Microscopy of microscopy | Amplification | Topology

Methods: Electron microscopy, sound microscopy

Instruments: Electron microscope - Zeiss Gemini Spura 55 VP
Audio recorder - Zoom H6
Stereo microphone capsule - XYH-6
Geophone - LOM Geofón
Electromagnetic microphone - Monacor AC-71
DIY contact microphone - Piezo-element, 20 mm, sealed
DIY contact microphone - Piezo-element, 15 mm

Sample: Piezo-Element, 15 mm diameter
Monocrystalline silicon wafer, 10 mm side length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Instrument | Microscope | Sensor | Sounding body

Methods: Optical light microscopy, sound micorscopy

Instrument: Optical light microscope - Zeiss Axio Imager.M2m
Audio recorder - Zoom H6
Stereo microphone capsule - XYH-6
Electromagnetic microphone - Monacor AC-71
DIY contact microphone - Piezo-element, 20 mm, sealed

Samples: Metallograpic cross sections of guitar strings, guitar pick-up magnets, piezo-elements, aluminium sheet metal

Open access lab

The open access lab is a community driven space where topics and specimen of interest can be investigated and accessed by everyone and free of charge. It is a space with cutting edge instruments, be it measuring instruments, artistic instruments or other instruments, laboratory infrastructure and workshops featuring a collection of in-stock lab consumables to investigate complex (research) questions. It is a space where citizen scientists of any experience level or professionals are welcome to pursue their research at any time. The open access lab is the ideal space to investigate questions that are defined as not relevant enough, because they target only a niche market or no market at all. No research question is wrong or too small, as long as it respects all the ethical guidelines of the lab, also the ones that include the more-than-human realms. Especially individuals of marginalized groups are welcome and encouraged to work on their (research) questions and topics of interest. To facilitate the usage of these instruments, there is a collective of experts always open to assist and support with specific questions and needs. There is also access to an extensive library and online resources on any form of knowledge. In the open access lab, it is allowed to adapt the equipment for own experiments and ergonomic preferences. Research that explores the limits of the instruments is encouraged. If a particular piece of equipment or infrastructure is damaged, it is repaired by the community. Long term rental of a specific instrument or lab space is possible upon request. There are also individual labs for large scale experiments, where teams or collectives can work together on a project. It's encouraged to bring or build your own instruments and to use unconventional techniques or alter procedures, as long as your own and the other lab users safety is ensured. It's also a space in which knowledge is shared openly. All results of the research carried out within the open access lab are published open source. Critical reflection on techniques, technologies, resources, common practice, ways of knowledge creation and collaboration is highly encouraged and another important pillar of the open access lab. If there are any suggestions for improvement or even better accessibility, the open access lab community will ensure its implementation. In the open access lab, accessibility, diversity and ethical aspects are valued over financial considerations.

What specimen, topics, questions would you like to investigate?

Lab diary

A lab diary has a more free form than a lab protocol. It is also about the personal experience and learnings throughout the research. It is a tool to reflect on the day and the experiments carried out, to plan next steps or pose questions.

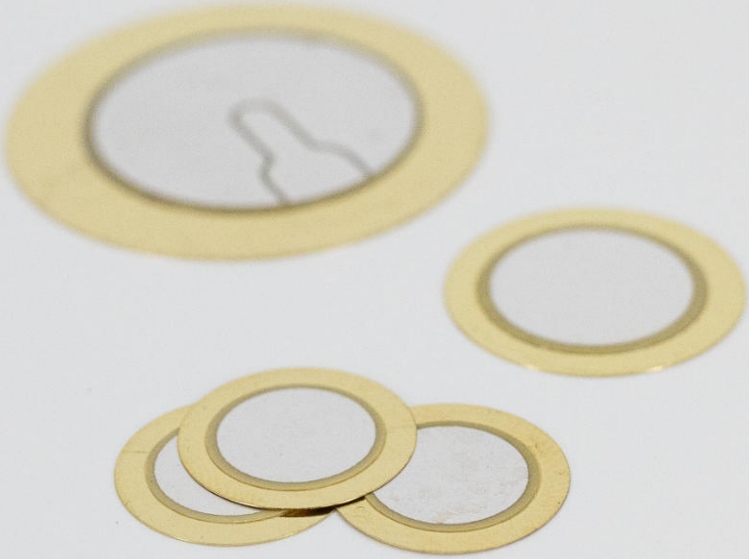
A lab diary is also a way to reflect on a process. A possibility to think about the own situated subjectivity on the field. It shall allow to reflect and investigate the personal, the bodily experience of being in a lab situation, of moving through a research process, may it be scientific or artistic or somewhere in-between. It can be seen as another experiment, one where the subject is part of its own investigation.

The subject is not only part of the process but also provides an additional perspective. A perspective that is usually invisible in the technical sciences. It is present, yet not present. It must be there, yet it is not supposed to interfere. It is in the background. In silence.

Daston and Galison (2007)[14] argue that objectivity is a performative discipline. It is a set of practices that produce the illusion of a neutral, disembodied point of view (Daston and Galison, 2007). Therefore, the lab diary acknowledges the paradox of objectivity and that the suppression of the human element can lead to the loss of situated understanding.

The lab diary is a vessel for that personal experience, as an addition to lab protocols. Especially when dealing with sound and microscopy in the wider sense, this affective level is essential. Another world of perspectives to see, to sense, to learn, to learn from, to learn with, to experience.

[14] Daston, L., & Galison, P. (2007). Objectivity. Zone Books. https://doi.org/10.2307/j.ctv1c9hq4d



Piezo-element

(dis)silence

Silence has many faces.

When an instrument is not played, is it silent? The sensor is still listening, it still picks up something, even if it is beyond its detection limit. It might be masked by silence, or it is just not possible to differentiate between the signal and the noise anymore. How does this silence sound? Is this silence (dis)silence?

It again poses the question of recognition. If we need to know what we look at to actually see, do we know silence enough to be able to really see it?

With the term (dis)silence I try to encapsulate the ambivalence of silence (or its impossibility) and the multifaceted nature of silence, its role in shaping our experiences, communication and artistic expression.

Disassembly as a form of microscopy

Disassembly, conceived as a form of microscopy, focuses on systems, processes, and complexes and breaking them down to enable detailed, microscopic examination

Such complexes could include - but is not restricted to - instruments, sensors, microscopes and sounding bodies, but also sounds, soundscapes, ecosystems, structures, topologies, languages, vocabularies, materials or practices, such as microscopy itself.

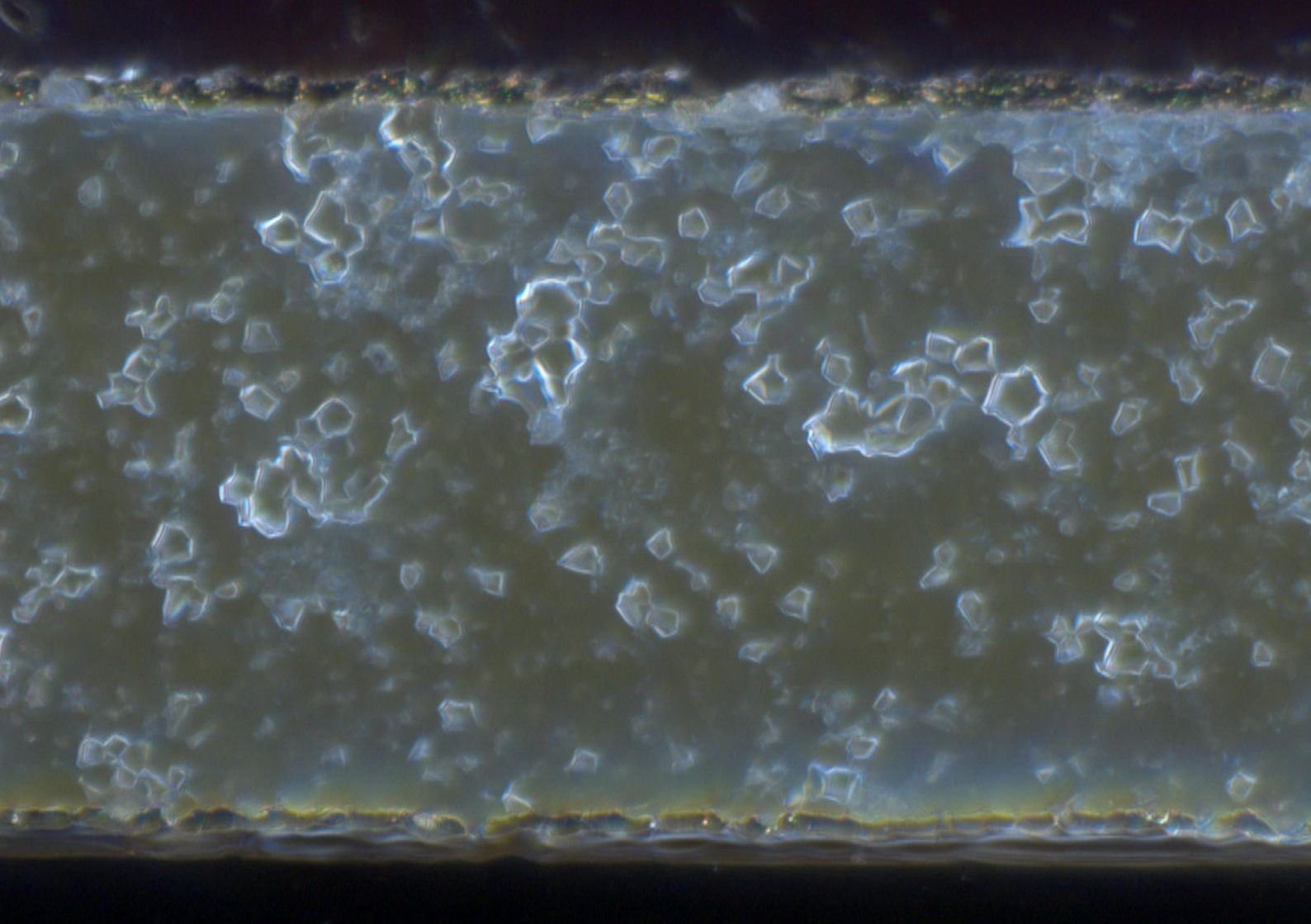
Disassembly as a form of microscopy is investigated as a practice to understand and deal with complexity. To accept, unbox and embrace complexity.

The analysis of the analysis is seen as a separate category of the disassembly as a form of microscopy. It can also be seen as microscopy of microscopy. It encompasses several conceptual perspectives within the realms of sound art and materials sciences. Technical and sonic microscopy are also investigated as analytical methods:

- Investigating technical microscopes with sound and sonic practices (listening, sound processing, soundscape composition)
- Investigating microphones and musical instruments with methods from the materials sciences, such as technical microscopy and metallography
- Investigating the process of analyzing a material with sound and sonic practices
- Investigating the practice of microscopy by means of the aesthetic, the experiential and the relational

Microscopy of microscopy | Amplification | Topology

Methods:	Electron microscopy, sound microscopy, disassembly as a form of microscopy
Instruments:	Electron microscope - Zeiss Gemini Spura 55 VP Audio Recorder - Zoom H6 Stereo microphone capsule - XYH-6 Geophone - LOM Geofón Electromagnetic microphone - Monacor AC-71 DIY contact microphone - Piezo-element, 20 mm diameter DIY contact microphone - Piezo-element, 15 mm diameter
Samples:	Piezo-element, 15 mm diameter Monocrystalline silicon wafers, 10 mm side length



Piezo-Element II

Method:	Light microscopy, dark field
Instrument:	Optical light microscope - Zeiss Axio Imager.M2m
Sample:	Piezo-element, 15 mm diameter
Preparation:	SiC grinding (600, 1200, 2500, 4000)
	Polishing: 3 µm and 1 µm diamond emulsion, colloidal silica suspension

0.16 mm

Encounter

There is something poetic in the microstructure of materials, their chemical composition, their topologies, their characteristics.

Materials testing sometimes reminds me a lot of getting to know someone. The mutual first impression. Sometimes it is more like recognizing the face of a close friend that you have not seen for a long time. Sometimes it is more like this excitement when meeting someone for the first time. Perhaps it is no coincidence that material properties are also be called material characteristics.

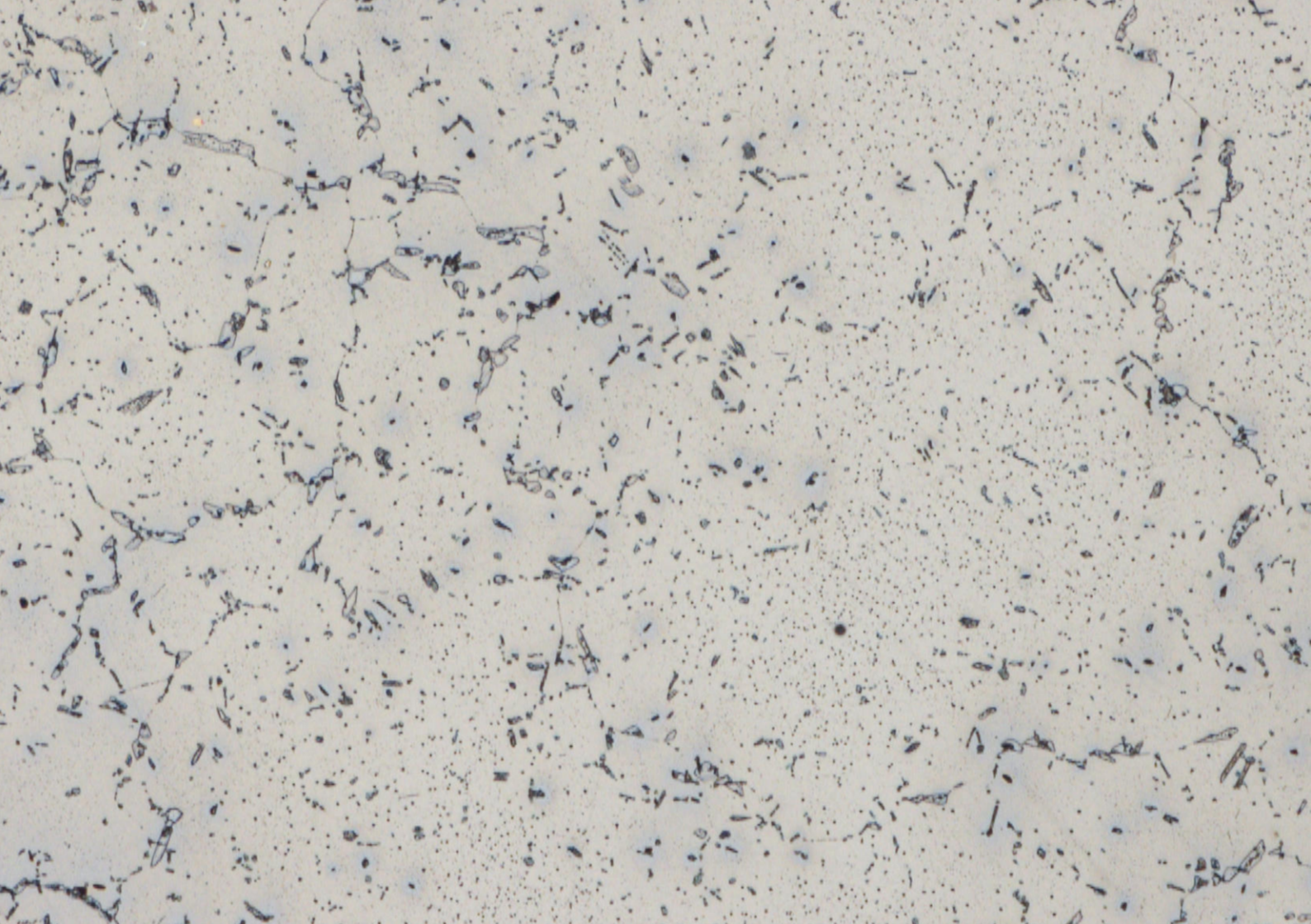
There is something violent about materials testing. It involves irritating or stressing the material and measuring its response to that stress in order to understand it better, to characterize it.

Sometimes I wonder how the materials see me. Do they remember me too?

Listen.

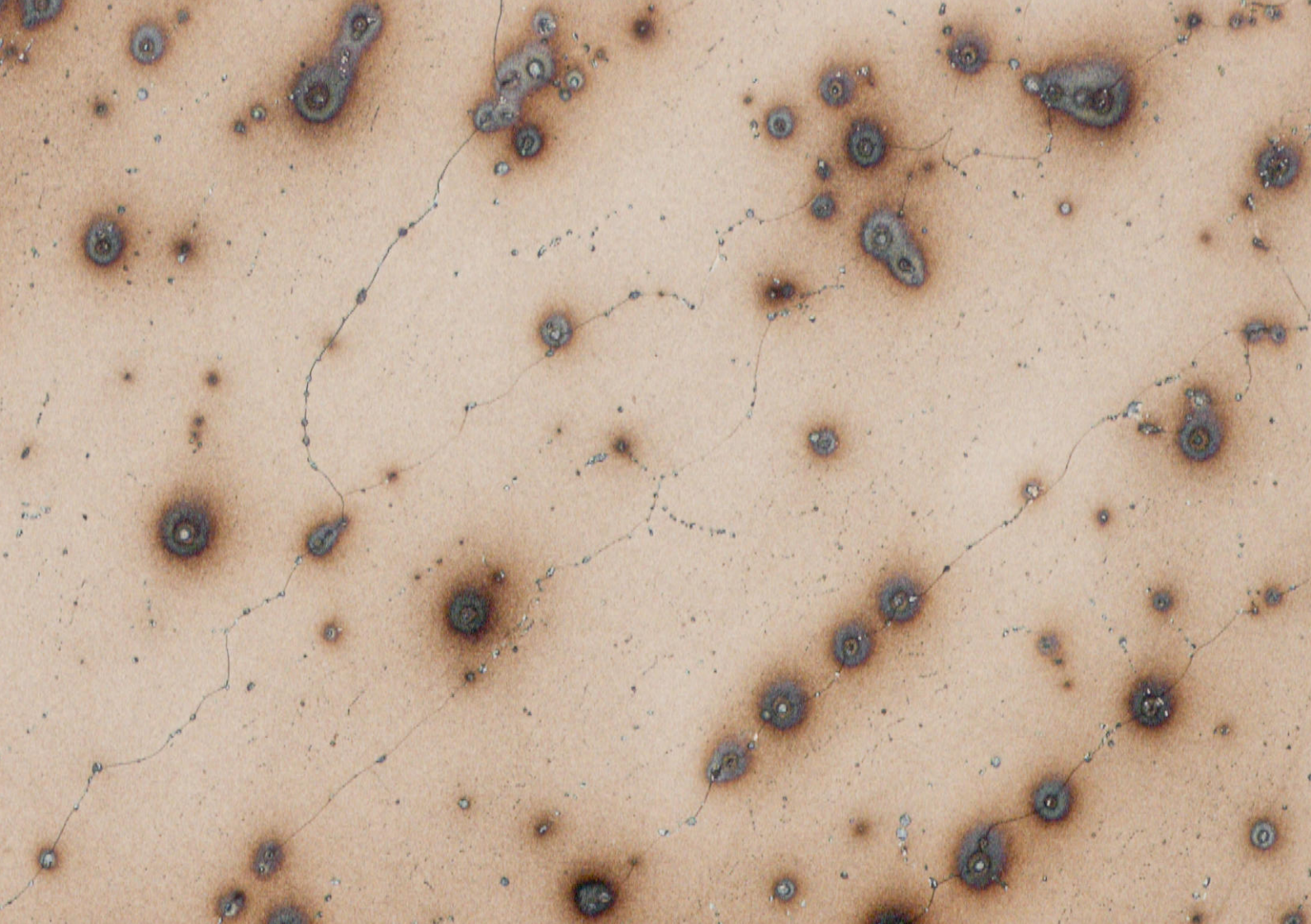
What do you hear?

Listen



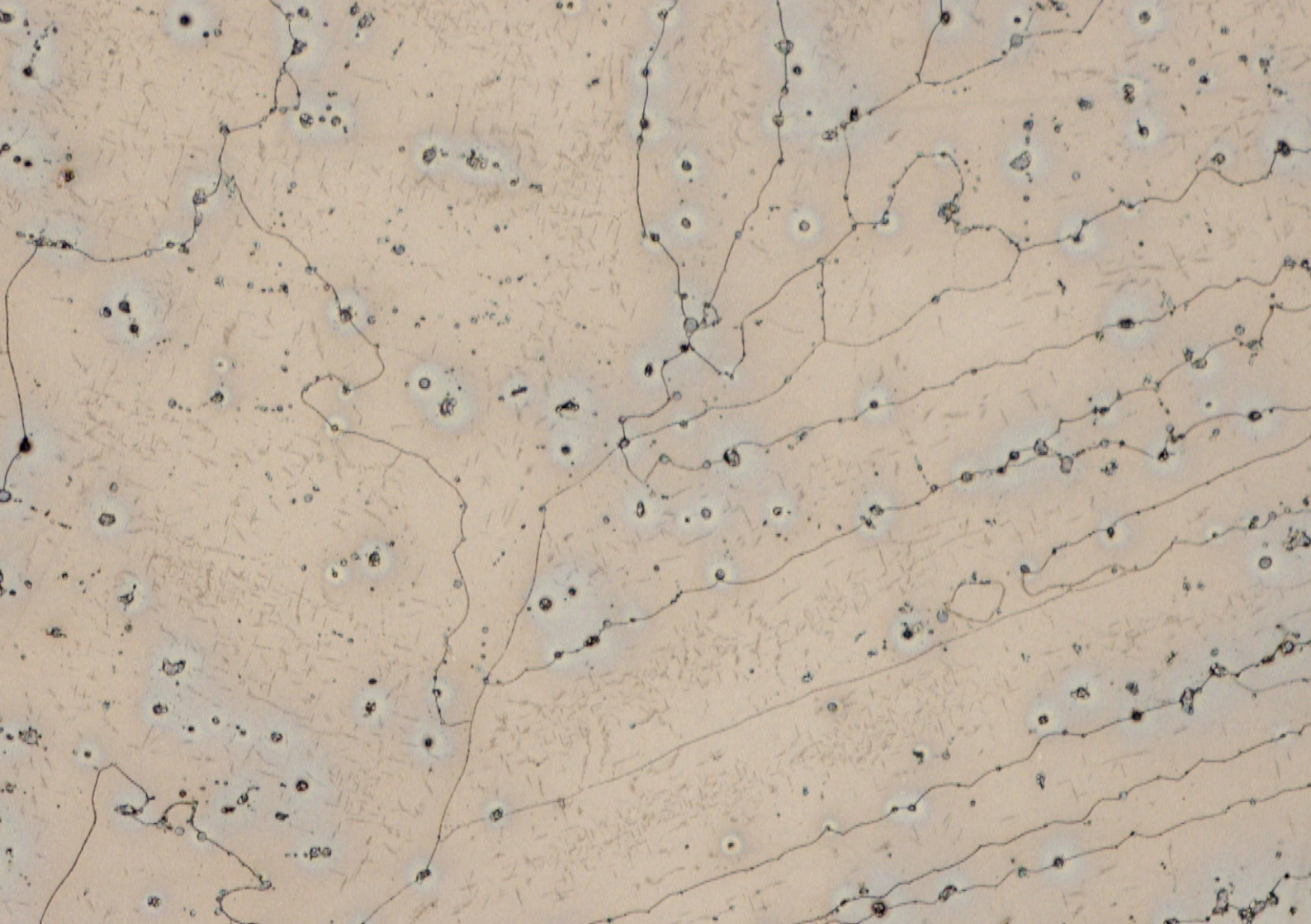
Disassembly as a form of microscopy

Method:	Reflective light microscopy
Instrument:	Optical light microscope - Zeiss Axio Imager.M2m
Sample:	Alnico 5 magnet for e-guitar pick-ups
Preparation:	SiC grinding (180, 600, 1200, 2500, 4000) Polishing: 3 µm and 1 µm diamond emulsion, colloidal silica suspension Etching solution: V2A



Disassembly as a form of microscopy

Method:	Reflective light microscopy
Instrument:	Optical light microscope - Zeiss Axio Imager.M2m
Sample:	Alnico 3 magnet for e-guitar pick-ups
Preparation:	SiC grinding (180, 600, 1200, 2500, 4000) Polishing: 3 µm and 1 µm diamond emulsion, colloidal silica suspension Etching solution: V2A



Disassembly as a form of microscopy

Method:	Reflective light microscopy
Instrument:	Optical light microscope - Zeiss Axio Imager.M2m
Sample:	Alnico 2 magnet for e-guitar pick-ups
Preparation:	SiC grinding (180, 600, 1200, 2500, 4000) Polishing: 3 µm and 1 µm diamond emulsion, colloidal silica suspension Etching solution: V2A

Silence.
Total absence of any acoustic signal, of any sound, of anything.
The zero point of calibration.
A reset. A restart. An end.
A state that can never truly exist.
Only by definition.

A hideaway, a place to disappear, a resting place.
Where nothing has to be.
Where nothing is supposed to be.
A well known friend.
With endless patience.
Sometimes soothing, sometimes toxic.

A vacuum, a carpet of possibilities, a sea of expectations.
A void.
Timeless, infinite, inexpressible.
Calling for activation.
Like in one of those dreams.
Where you know you can fly, but actually can't, when you need it.

A space with no doors, a hall of mirrors, a labyrinth.
Where you forget the sound of your voice.
Its colors. Its forces. Its senses.
How it feels to activate it.
Like in one of those dreams.
Where you want to use your voice, but actually can't, when you need it.

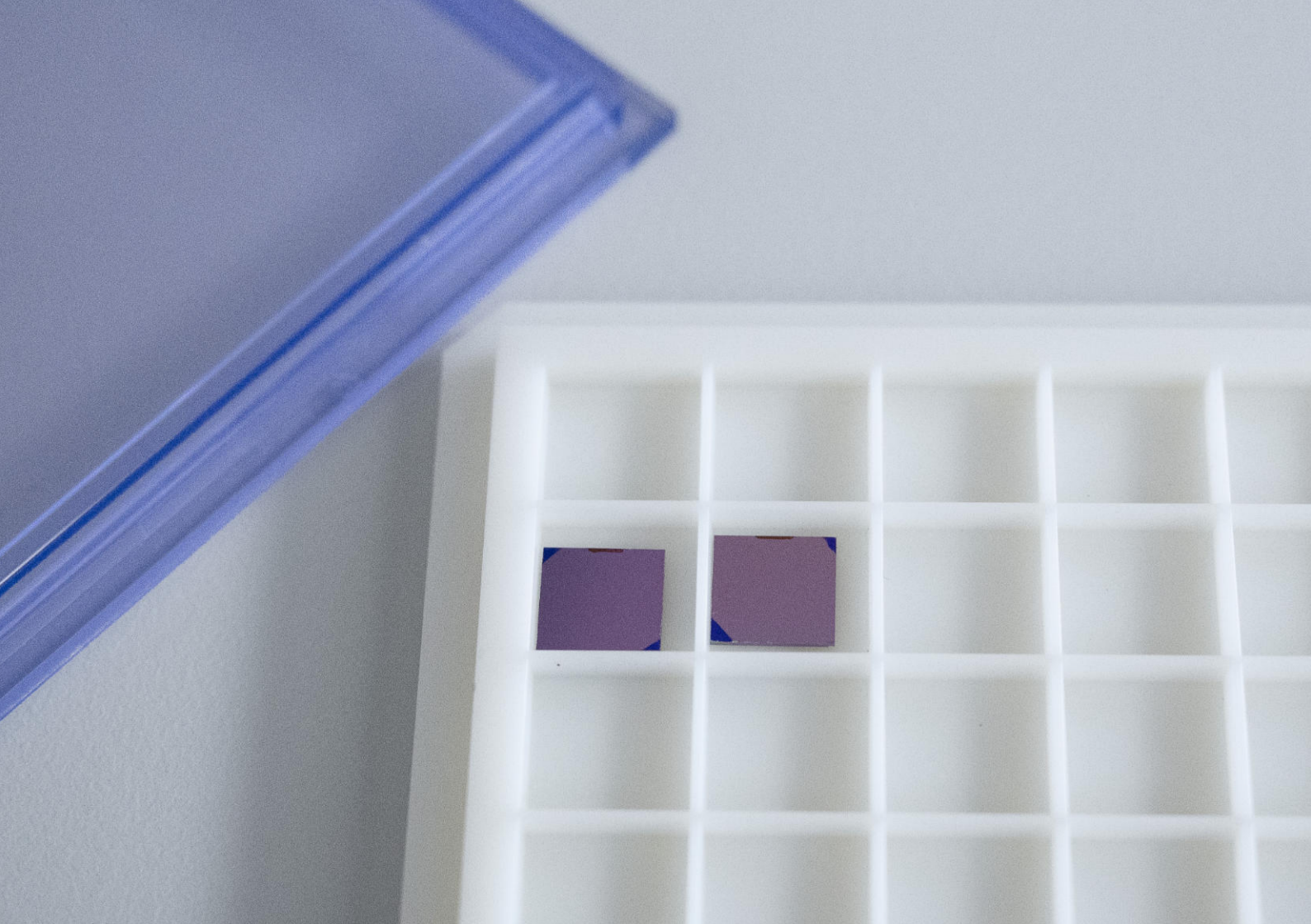
Silence

Material | Erinnerung | Geschichte

Mich interessiert die Herkunft der Mikroskope und Sensoren, die ich einsetze, und deren Ausgangsmaterialien sowie die Bedingungen unter denen sie verarbeitet wurden. Welche Leben sind damit verstrickt? Etwas, das mit komplexen globalen Lieferketten kaum nachvollziehbar ist.

Welche Geschichte haben die Atome, die in diesem Piezo-Element stecken, mit dem ich hier diese Klänge aufnehme? Aus welchem Gestein wurden die Elemente gewonnen, die jetzt im Tonabnehmer meiner Gitarre eine metallische Bindung mit ihren Nachbaratomen eingehen? In welchen Verbindungen lagen sie vor? Wie sah der Baum aus, aus dem das Klavier gebaut wurde, von dem ich ein Stück Holz zum Bau meiner Gitarre wiederverwendet habe? Wer war dieser Baum und wann?

In jedem Material steckt eine Geschichte, die jenseits meiner Vorstellungskraft liegt. Die Materialien waren vielleicht schon vor mir da. Die Atome noch vor den Materialien. Vor dem Baum war das eine Kohlenstoffatom vielleicht auch schon Teil eines Lebewesens, von dessen Existenz kein erkennbares Zeichen mehr vorhanden ist.



Sounding body | Microscopic text | Silicon

About microscopy, is also about the microscope.

Microscopy

0.6 mm