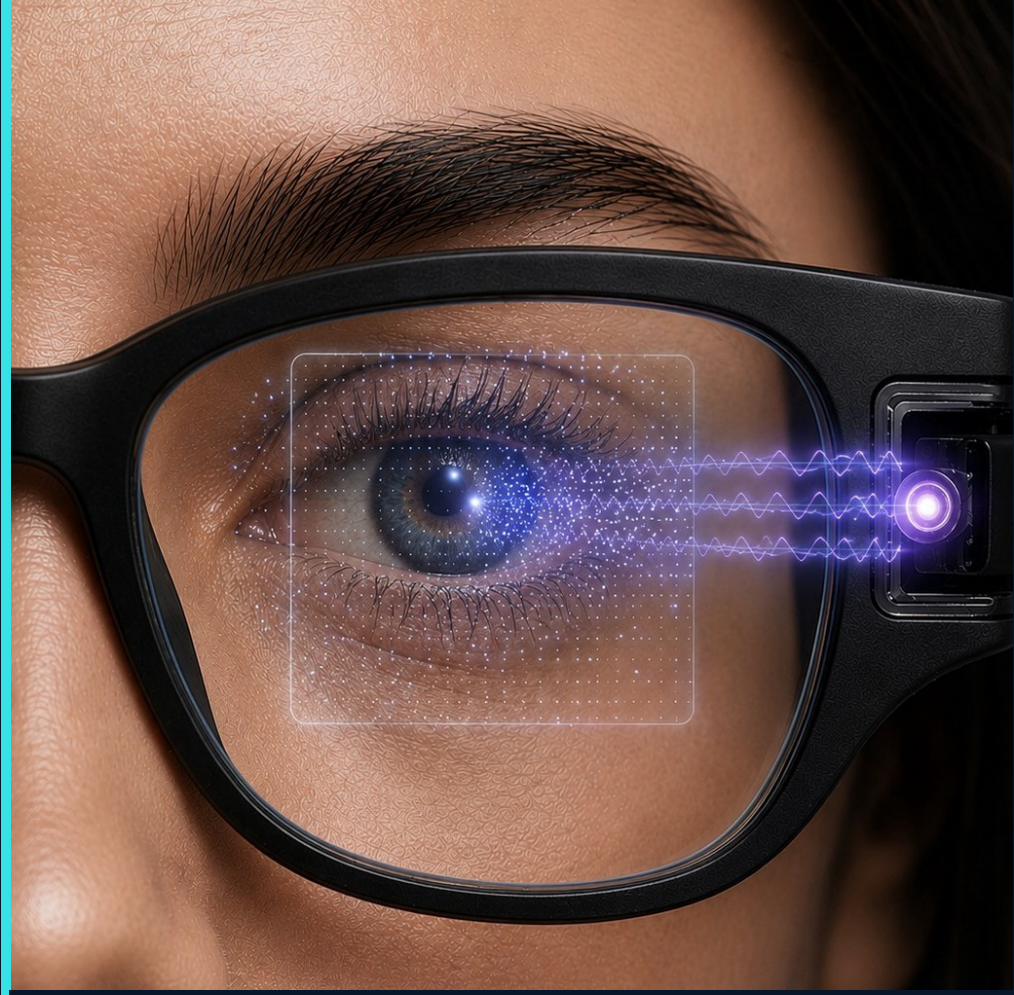
THE FUTURE LOOKS FAMILIAR

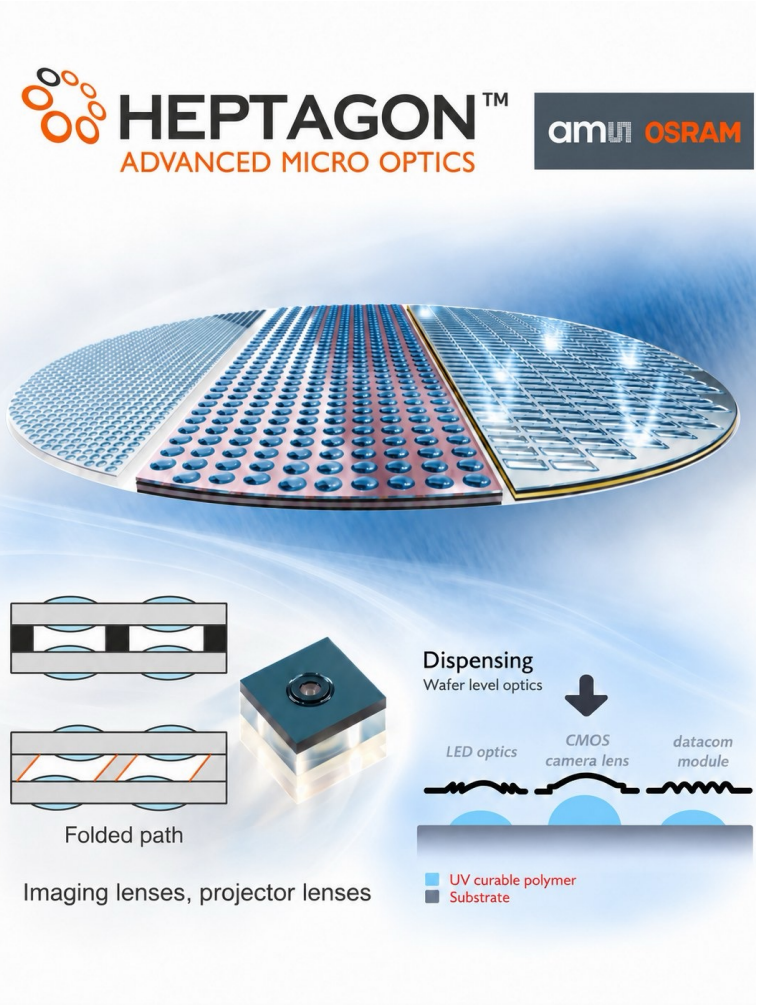
— UNTIL IT DOESN’T

From phones that learned to see
to glasses that may learn to understand

Markus Rossi · Founder & CEO, AlphaLum



From Heptagon to AlphaLum: not a retrospective …



Heptagon → smartphones

We learned how to turn miniature, multi-purpose optics into repeatable products shipped at global scale.

One learning journey ended. Another one, even more exciting, has just begun.

AlphaLum → agentic eyewear

A new challenge. Familiar engineering hurdles. And a future that may be radically different.

The first platform moment: phones did not just get cameras.

They became sensing and interaction platforms – often in ways we could not fully anticipate..



IMAGING + COMPUTATIONAL VISION



DEPTH + IDENTITY + INTERACTION

Heptagon helped industrialize micro-optics behind the smartphone era.

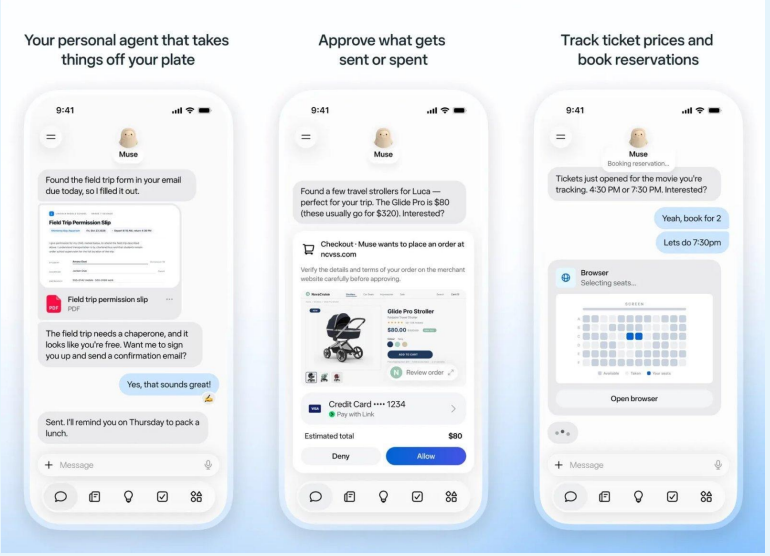
The next killer app may not be an app.

Personal agents, not collections of icons, may become the new interface to computing.

META · MUSE

"Muse can act on what you're looking at."

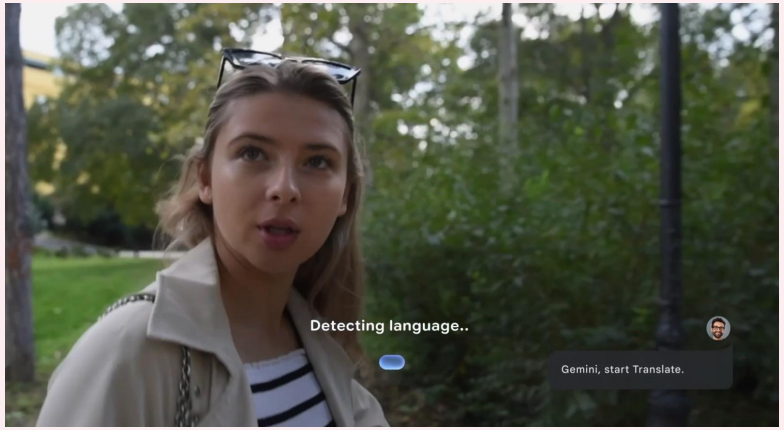
An agent that can use perception and services to help complete tasks.



GOOGLE · GEMINI + ANDROID XR

"AI and XR are converging."

Conversational, multimodal assistance across a range of device types.



New possibility: computing responds to our context – not just to commands.

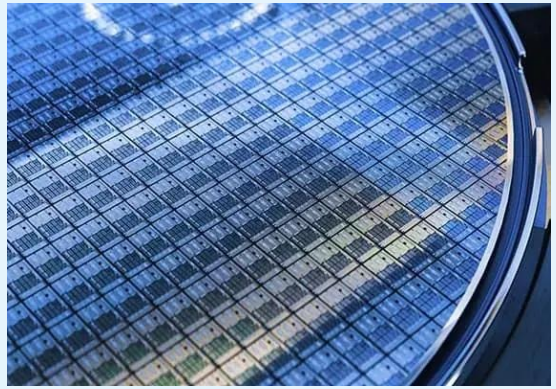
CONVERGENCE

Smart glasses must meet three very different sets of requirements.

Each industry brings established technologies, processes and assumptions that do not naturally fit together.

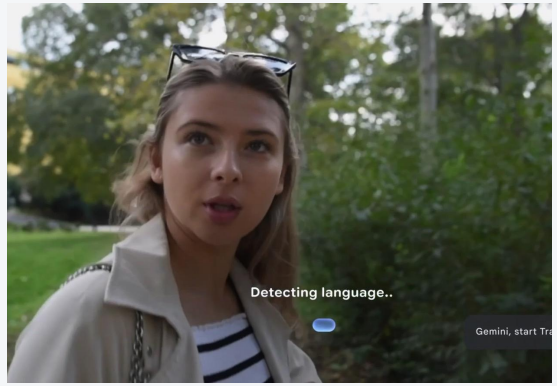
CONSUMER ELECTRONICS

Powerful silicon
High-volume repetition
System integration
Global supply chains



PERSONAL AI AGENTS

Continuous context
Multimodal perception
Useful action
Adaptive interfaces



OPHTHALMICS + FASHION

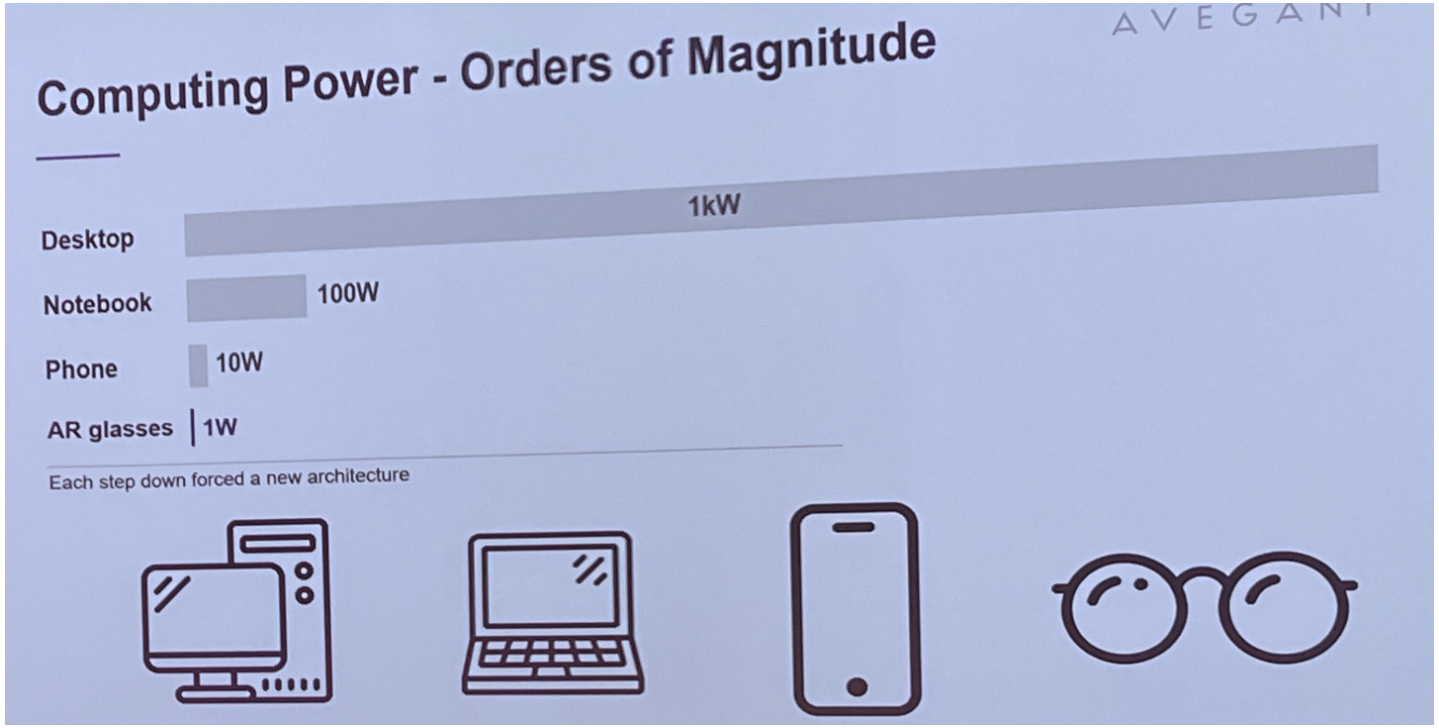
Prescription and fit
Personalized lenses
Comfort all day
Style and identity



Phones standardized the device. Eyewear must adapt to the person.

The closer computing gets to us, the less power we can afford.

The available thermal envelope shrinks just when the requirements expand.



Illustrative order-of-magnitude comparison from Avegant; not a universal specification.

THE REAL CONSTRAINT

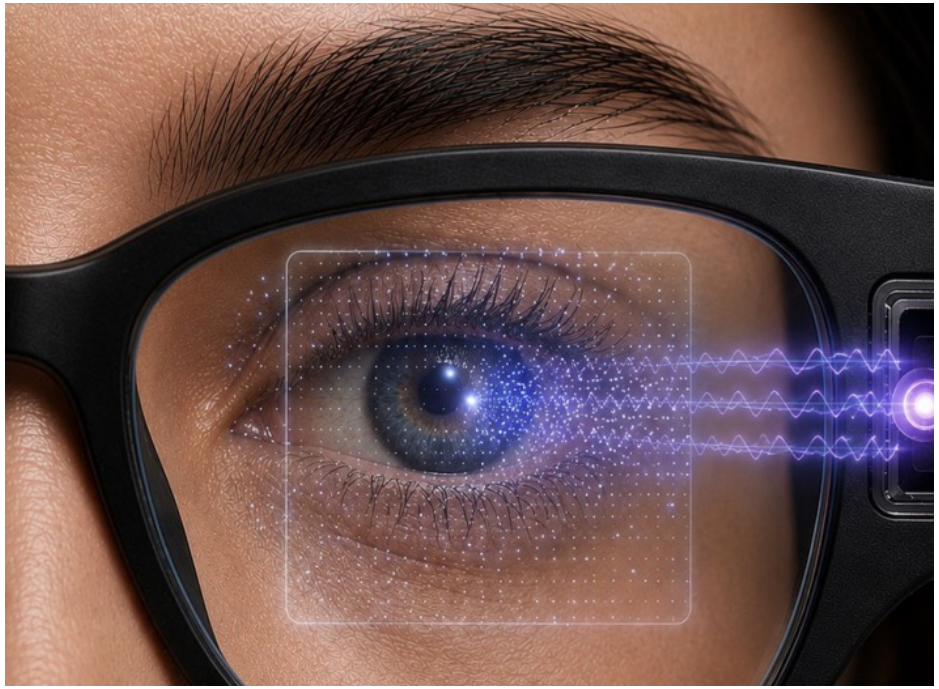
No fan. Little heat spreading. Skin-temperature limits.

THE DESIGN CONSEQUENCE

Optical efficiency and sensing power become architectural choices.

Two fundamentally new architectures — not incremental improvements.

A human–agent interface needs efficient output and unobtrusive input.



AGENT → HUMAN

HoloWedge: a different way to bring digital images to the eye.

HUMAN → AGENT

MOTIA: a different way to capture micromotion with tiny, low-power optics.

“The biggest breakthroughs don't come from optimizing existing solutions, but from rethinking the architecture.”

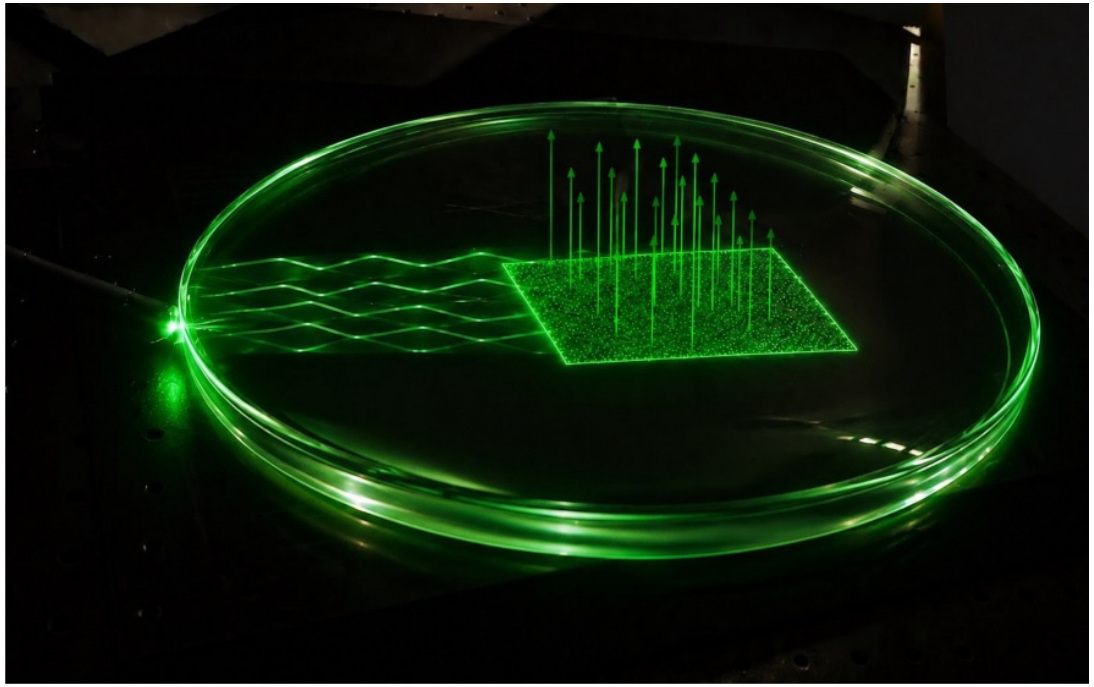
Validated by 3+ years of co-development with leading smart-glass OEM

Protected by 47 patents across 25+ patent families.

OUR FIRST BREAKTHROUGH

HoloWedge: redesign the light path.

A transparent image plane combining volume holograms with precision-molded polymer optics.



HOLOGRAMM + MOLDED POLYMER OPTICS

EFFICIENCY

Reduce the optical losses that drain power.

→ 10 – 20x higher (eyebox) efficiency than waveguides

PERSONALIZATION

Curved, cut-to-shape polymer-based optics.

MANUFACTURABILITY

Molded parts and laminated optical films

→ compatible with ophthalmic supply chain.

Optical concepts and demonstrators validated; final improvements of image quality, yield and qualification remain gates.

The magic of volume holograms.

Why a thin polymer film can do what diffractive or meta-optics cannot.

SPECTRAL + ANGULAR SELECTIVITY

Records 3D interference patterns inside a photopolymer.

MULTIPLEXING

Many holograms can coexist in a single film.

THE SYSTEM ADVANTAGE

Projector light can be steered while retaining see-through vision.



Years of know-how become important when recording, scaling of automated replication and metrology is next.

An agent can see the world. Does it understand its wearer?

Where we look is useful—but gaze alone is not the same as attention, intent or readiness to engage.

TODAY: WORLD-FACING PERCEPTION

Cameras can recognize scenes, objects, text and parts of our activity.

STILL DIFFICULT: WEARER INPUT

Eye tracking is constrained by space, power, calibration and integration.

NEXT QUESTION: USER STATE

Can micromotion give subtle cues about engagement or when not to interrupt?



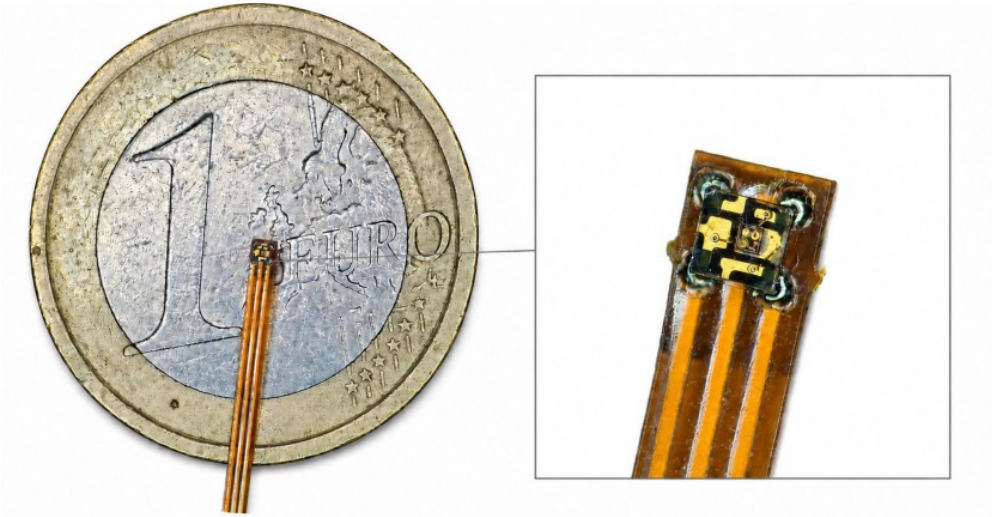




OUR SECOND BREAKTHROUGH

SMI: a laser that detects its own echo.

AI creates the need for richer sensing – and offers a way to decode the signals.



SELF-MIXING INTERFEROMETRY

NIR SMI VCSEL

Reflected light interferes inside the emitting laser.

SIGNAL

Eye and/or skin micromotion produces a rich optical waveform.

EDGE AI

A trained encoder can turn that waveform into useful features.

Single-digit-mW product-system demos proven; capability varies by task.

From Motion to Meaning

Micromotion sensing for richer AI-agent interaction — targeting <5 mW total system power, including compute.



EYE DYNAMICS

Blink, saccade, reading

- Cues for attention and engagement
- Know when to interrupt — or stay quiet



GAZE

Direction, point of regard

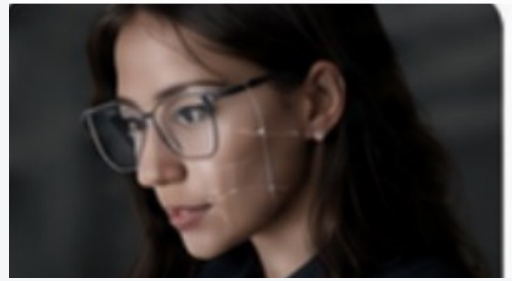
- Understand what “this” or “that” refers to
- Hands-free selection and interaction



SILENT SPEECH

Mouthed commands

- Discreet commands without speaking aloud
- Confirm, dismiss or navigate privately



LIVENESS

Wearer presence

- Verify that a real wearer is present
- Support trusted, always-available interaction

The goal is not more data for its own sake. It is an agent that knows when to help.

AlphaLum Facts

Lausanne

Our headquarters — with team members based all across Switzerland.



35+

Engineers working in optics, sensing and AI. Several are alumni of Heptagon, Intel, Magic Leap, ams OSRAM, KeyLemon.

Spin-off

From the Innovation Office of ams OSRAM – a company with local roots and global connections.

ALPHALUM