Ovonic Cognitive Computer, Inc.

OCC OFFERS THE VITAL PIECE TO COMMERCIALIZING YOUR AI TECHNOLOGY

Ovonic Cognitive Computer, Inc. ("OCC") was founded in 2002 by Stan Ovshinsky to commercialize a revolutionary new approach to cognitive computing or artificial intelligence that he and his team had been developing for decades.

OCC is licensed to use all Ovonyx, Inc. and Energy Conversion Devices, Inc. developed patents (which are currently controlled by Micron), as related to chalcogenide switching devices used for cognitive computing applications.

Cognitive elements are assembled from Ovonic Memory Switches used as analog weighting elements for inputs and thresholding outputs.

Ovonic Threshold Switches are used for high current drive, and as three terminal logic and isolation devices.

Optical behavior of chalcogenide alloys is employed for electrical to optical signal transmission.

Intel and Micron are currently manufacturing and selling 3D XPoint memory using this technology.

"Chalcogenide material and an Ovonyx switch are magic parts of this technology with the original work starting back in the 1960's" - Guy Blalock, co-CEO of IM Flash at ISS-2016 (January 12, 2016)

WITH THEIR EFFORTS STARTING IN THE 1950'S, STAN AND HIS OCC TEAM ARE THE TRUE PIONEERS OF AI (ARTIFICIAL INTELLIGENCE) TECHNOLOGY

1955 - Stan Ovshinsky develops his ideas for cognition in a paper presented at Wayne State University Medical School entitled "Nerve Impulse"

1959 - Stan develops a switch using TaOx electrolyte called the Ovitron

1961 - Stan begins developing a solid-state switch to perform similarly

1962 - Stan patents Metal Oxide RRAM devices

1963 - Exhaustive study of the switching properties of materials is undertaken

1964 - Chalcogenide alloys are employed, exhibiting both threshold and memory switching

1970 - Series connected threshold and memory switches make a radiation hard memory

1986 - Monolithic integration of threshold and memory switches make a 3D memory

1990 - Ge2Sb2Te5 is employed to make high performance memory

1996 - PCM scalability is demonstrated

1999 - Ovonyx is formed to commercialize PCM

2001 - Boil Pashmakov characterizes new 'cognitive' behavior in PCM

2002 - Ovonic Cognitive Computer is formed to develop Cognitive Chalcogenide Computers

2008 - Numonyx is formed and produces the first 4f2 3D nonvolatile memory array

2014 - Cognitive computer emulation becomes viable using TerraFLOP GPU computers

2015 - Intel/Micron announce 3DXpoint, a high performance nonvolatile chalcogenide memory

2016 to Present - Ovonic Cognitive Computer continues their chalcogenide development work

OCC'S LICENSE PROVIDES ACCESS TO TECHNOLOGY THAT IS THE KEY TO "REAL" NOT "SIMULATED" AI

3D XPoint is Ovonic Threshold and Memory Switches connected in series.

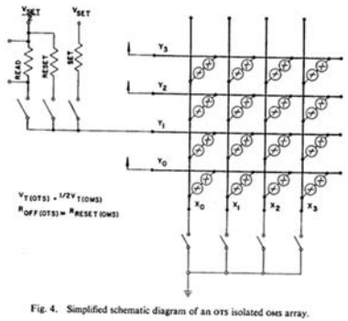
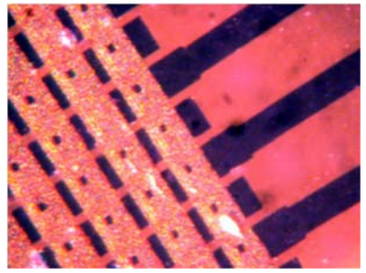
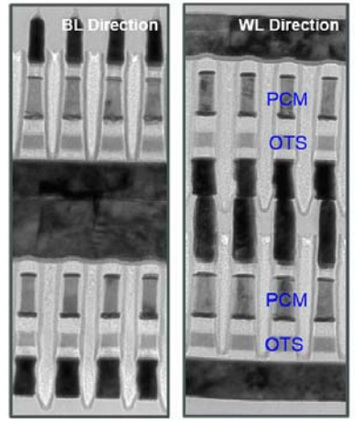


Fig. 4. Simplified schematic diagram of an OTS isolated OMS array.

OTS/PCM ECD 1970



3D integration 1987

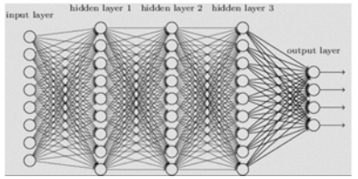


3DXpoint Cross Section shows ECD's Memory and Threshold Switch

Tech Insights

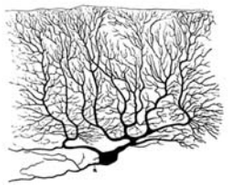
OCC RIGHTS RELATE TO THE CRUCIAL COMPONENTS (SWITCHES) TO CREATE AI

OCC has rights to all Ovonyx patents – the "magic" behind 3D XPoint, as related to cognitive computing applications.

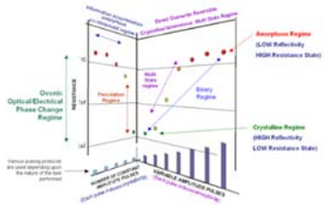


Today's cognitive computers emulate models of weighted inputs and fixed thresholds to achieve simple pattern recognition.

Ovshinsky recognized that repetitive pulsing is an inherent part of cognition in neurons. Neurons exhibit fatigue due to depletion when repeatedly pulsed. Neurons trigger on a threshold accumulation of inputs but are very sensitive to pulse repetition. This adds another dimension to their ability to interpret data.

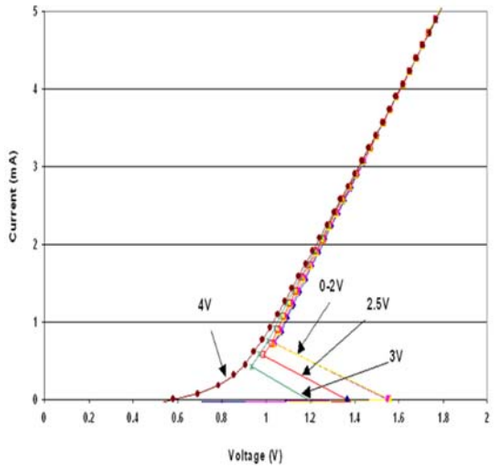


The complex behavior of chalcogenide alloy switching devices offers the opportunity to more closely mimic the behavior of a neuron using nanosecond scale speeds. This could permit much larger network sizes that can be trained and operated 1000 times faster than GPU emulation.

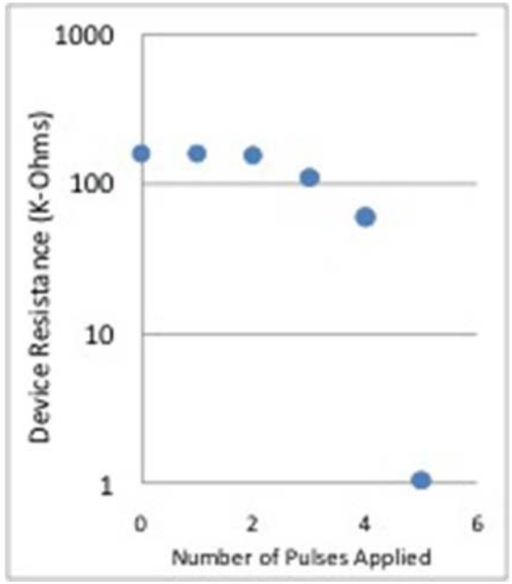


AI IS ADVANCING WITH OCC-LICENSED TECHNOLOGY AS THE CORE COMPONENT

3 TERMINAL OTS



COGNITIVE DEVICE

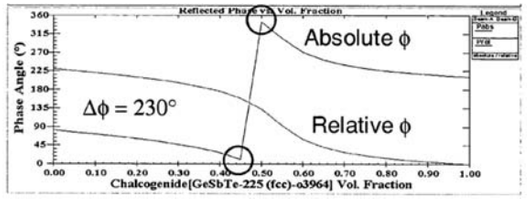


OCC'S LICENSED PATENT PORTFOLIO ALSO INCLUDES ACCESS TO SIGNIFICANT OPTICAL TECHNOLOGY RIGHTS

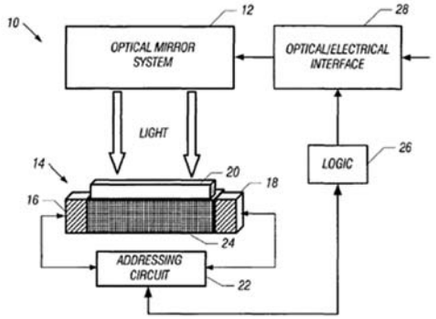
Electro-Optical Devices

A major limitation of current CMOS technology is its limited current drive.

Chalcogenide OTS devices can drive current densities 50X greater than silicon.



Nonlinear optical effects can allow optical switching of signals permitting coupling of electrical and optical signals on the same substrate.



U.S. Patents: 8111546, 7596016, 7447404

OCC LICENSE INCLUDES ATTRACTIVE TERMS

OCC'S LICENSE TO A LARGE PORTFOLIO OF PATENTS IS FUNDAMENTAL TO AI TECHNOLOGY DEVELOPMENT AND COMMERCIALIZATION.

IP summary and License Summary:

- Over 300 patents are licensed by OCC, involving all aspects of chalcogenide alloy deposition and use for cognitive computing and optical signal switching. This IP is essential part of the technology behind 3D XPoint.
- Specifically, OCC has the rights to use this technology for all cognitive computing applications (but not for commodity memory) at attractive royalty rates.
- OCC also has a royalty-free license to use chalcogenide devices for electro-optical and waveguide applications.

OCC IS SEEKING PARTNERS, INVESTORS OR AN ACQUIRER INTERESTED IN EXPLOITING ITS AI AND OPTICAL IP POSITIONS

OCC IS SEEKING PARTNERS, INVESTORS OR AN ACQUIRER INTERESTED IN UTILIZING ITS EXPERTISE AND STRONG IP POSITION FOR COGNITIVE OR OPTICAL APPLICATIONS OF CHALCOGENIDE SWITCHING DEVICES.

Ovonic Cognitive Computer, Inc.

Contact:
Greg Coppola
Senior Vice President & Chief Financial Officer
(734) 968-5434 (cell)
gcoppola@ovoniccognitivecomputer.com

www.ovoniccognitivecomputer.com