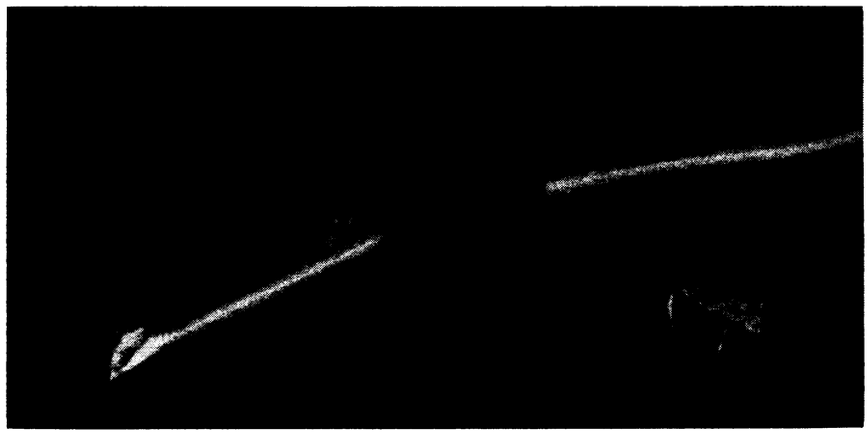
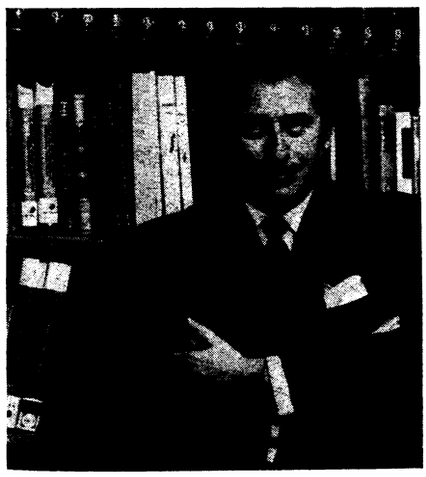
OVONICS

After the transistor



ECD

Amorphous thin-film switch plated on current-carrying wires.



ECD

Ovshinsky: Do what transistors do.

Physicists have made good progress in the last decades in explaining the behavior of crystalline solids. Their work has been reflected in many engineering discoveries, prominent among them the transistor.

There has been less work done on amorphous—noncrystalline—solids, and fewer devices have come from them.

Amorphous solid materials now show promise of being fabricated into electronic devices that will do many things that transistors made of crystalline materials can do.

So reports Stanford R. Ovshinsky of Energy Conversion Devices, Inc., in PHYSICAL REVIEW LETTERS for Nov. 11. Ovshinsky formed the company to exploit the phenomenon.

Successful use of crystalline materials has been based on their orderly structures, their regular lattices of atoms. Into this regularity impurities can be introduced—by nature or by artifice—and the impurities contribute free electrons. These can be used to make certain materials electrically conducting under the proper conditions of numbers and voltage.

Ovshinsky's development is based on the fact that though amorphous materials have a disorderly structure in the large, in small volumes chemical bonding forces impose an order somewhat similar to that in crystals.

In these somewhat distorted lattices electrons are trapped, and these will become available to conduct electricity when a certain threshhold voltage is applied. The voltage can vary from about one-half volt to 200 volts depending on material and thickness.

Thus, such an object could be used as a switch, opening or closing a circuit as the voltage is changed. Further, the effect works in both directions, unlike the usual crystalline semiconductors which will work for current going in one direction. Therefore, the amorphous material can be used to switch alternating current.

NEWS BRIEFS

Evolution legal; space

- The Supreme Court has struck down as unconstitutional the Arkansas statute that forbade teaching the theory of evolution in the public schools (SN: 11/2, p. 440).
- Two Mariner craft will orbit Mars for three months, beginning November 1971, according to new space agency plans. They could examine more than 70 percent of the Martian surface and perhaps the planet's two moons (SN: 8/24, p. 179).
- Apollo 7 was so successful NASA has given a green light for its successor to attempt up to 10 orbits of the moon. Planned date, about Dec. 21 (SN: 11/2, p. 442).