Scientists advance photonic technology

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Scientists at Denmark's Aalborg University have created a family of devices for guiding and processing light in chip-based information technology.

Sergey Bozhevolnyi and colleagues say their research will help overcome a main obstacle -- the difficulty of manipulating light at very small scales -- to making "photonic" technology comparable to microelectronics.

The scientists say the key problem for "microphotonics" is that light can only be transmitted through channels and holes wider than its wavelength. Today's fiber-optic telecommunications use wavelengths of about 1.5 micrometers -- much bigger than the channels in present-day silicon chips.

But Bozhevolnyi's team suggests light waves can be used to excite collective, wavelike motions of electrons known as plasmons on the surface of metals. Plasmons aren't restricted by size limit.

The researchers previously demonstrated some plasmons can move -- in the form of linked light and electron waves -- along the bottom of V-shaped grooves in metal, grooves that are much narrower than the wavelength of the light.

The scientists now have shown such channels can be shaped to act as photonic devices for splitting and modifying light signals.

The research appears in this week's issue of the journal Nature.