GEORGIA TECH RESEARCH

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VISIBLE LIGHT CHEMICAL LASER AMPLIFIER CONVERTED TO FULL OSCILLATION

For Immediate Release

February 21, 1989

Physicists at the Georgia Institute of Technology announced in October 1987 that they had developed what were believed to be the first two chemically-powered laser amplifiers operating in the visible spectral region.

Now, collaborators K.K. Shen and James Gole report they have converted one of the systems to full oscillation. Their results have been submitted to Chemical Physics Letters.

To gain full oscillation, the researchers extended their successful pulsed amplifier concept, which relies on the rapid transfer of energy from a highly excited metastable germanium oxide molecule to a thallium atom. Gole said the germanium-ozone reaction was chosen to produce the metal monoxide whose stored energy was transferred to thallium atoms, which subsequently lased at 535 nm, producing green light.

Thallium was chosen as the receptor atom because its ground state is split into two widely separated levels. Thallium atoms in the lower of these two energy levels receive energy from the highly excited germanium oxide molecules.

In this process, the thallium atoms are pumped to an excited state lying at considerably higher energy than the upper level of the thallium atom ground state, creating the necessary population inversion with respect to this lower level, Gole reported.

When this amplifying medium is surrounded by a three percent output coupled-cavity configuration, the laser power level increases by more than a factor of ten, accompanied by a subsequent enhanced directionality.

The research group has also developed two additional amplifiers operating in the blue-violet region, and is currently working to extend their concepts.

Chemically-powered lasers would have applications in space, or in any environment where electricity to operate conventional lasers is not available.

EDITOR'S NOTE: A copy of the original news release is enclosed for reference.