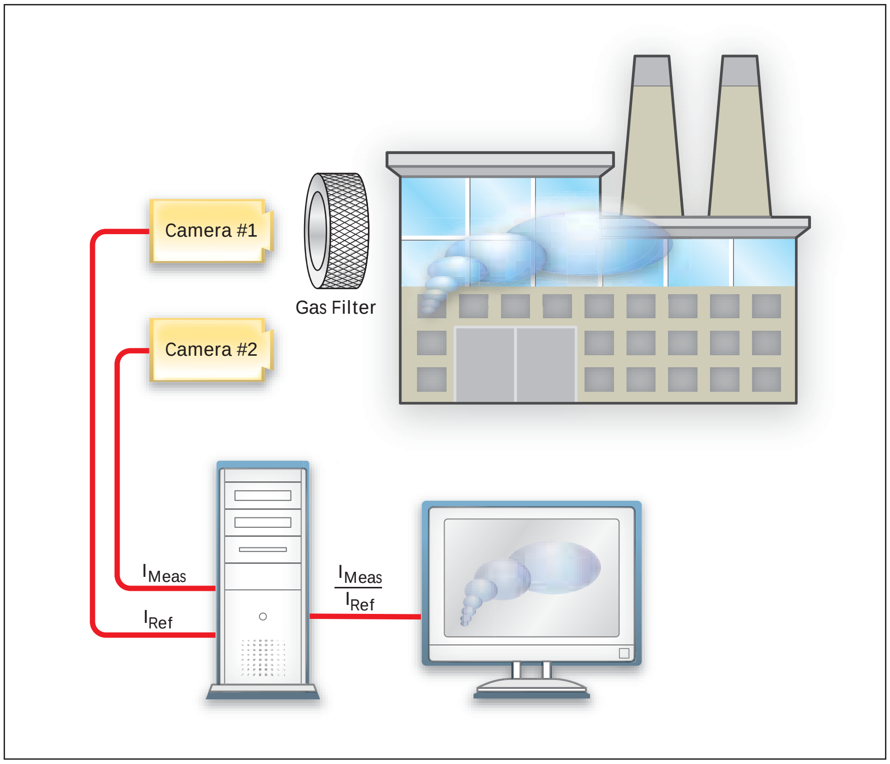

The **Two-Camera Version of the Infrared Camera System** features two cameras with essentially the same view and time.

same signal ratio is obtained for both high- and low-background signals, even though the low-signal areas may have greater noise content due to their smaller signal strength. Thus, one embodiment would use a ratioed output signal to better represent the gas column concentration.

An alternative approach uses a simpler multiplication of the filtered signal to make the filtered signal equal to the unfiltered signal at most locations, followed by a subtraction to remove all but the wavelength-specific absorption in the unfiltered sample. This signal processing can also reveal the net difference signal representing the leaking gas absorption, and allow rapid leak location, but signal intensity would not relate solely to gas absorption, as raw signal intensity would also affect the displayed signal.

A second design choice is whether to use one camera with two images closely spaced in time, or two cameras with essentially the same view and time. The figure shows the two-camera version. This choice involves many tradeoffs that are not apparent until some detailed testing is done. In short, the tradeoffs involve the temporal changes in the field picture versus the pixel sensitivity curves and frame alignment differences with two cameras, and which system would lead to the smaller variations from the uncontrolled variables.

*This work was done by Robert Youngquist and Dale Lueck of Kennedy Space Center and Christopher Immer and Robert Cox of ASRC Aerospace Corporation. Further information is contained in a TSP (see page 1)****.*** *KSC-13207*

Submonolayer Quantum Dot Infrared Photodetector

NASA's Jet Propulsion Laboratory, Pasadena, California

A method has been developed for inserting submonolayer (SML) quantum dots (QDs) or SML QD stacks, instead of conventional Stranski-Krastanov (S-K) QDs, into the active region of intersubband photodetectors. A typical configuration would be InAs SML QDs embedded in thin layers of GaAs, surrounded by AlGaAs barriers. Here, the GaAs and the AlGaAs have nearly the same lattice constant, while InAs has a larger lattice constant.

In QD infrared photodetector, the important quantization directions are in the plane perpendicular to the normal incidence radiation. In-plane quantization is what enables the absorption of normal incidence radiation. The height of the S-K QD controls the positions of the quantized energy levels, but is not critically important to the desired normal incidence absorption properties. The SML QD or SML QD stack configurations give more control of the structure grown, retains normal incidence absorption properties, and decreases the strain build-up to allow thicker active layers for higher quantum efficiency.

*This work was done by David Z. Ting, Sumith V. Bandara, and Sarath D. Gunapala of Caltech and Yia-Chung Chang of the University of Illinois for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1)****.*** *NPO-46115*

Mode Tracker for Mode-Hop-Free Operation of a Laser

Lyndon B. Johnson Space Center, Houston, Texas

A mode-tracking system that includes a mode-controlling subsystem has been incorporated into an external-cavity (EC) quantum cascade laser that operates in a mid-infrared wavelength range. The mode-tracking system makes it possible to perform mode-hop-free wavelength scans, as needed for high-resolution spectroscopy and detection of trace gases. The laser includes a gain chip, a beam-collimating lens, and a diffraction grating. The grating is mounted on a platform, the position of which can be varied to effect independent control of the EC length and the grating angle.