Laser Focus World

NEWSBREAKS

MBE growth of indium antimonide reduces cost of infrared arrays

At the Center for Quantum Devices (CQD) at Northwestern University (Evanston, IL) scientists have demonstrated 3- to 5-μm focal-plane 256 × 256-pixel array imaging using indium antimonide (InSb) grown on a gallium arsenide (GaAs) substrate. The advantage of growing the material on GaAs wafers by molecular beam epitaxy (MBE) is the resulting structural strength and uniformity as compared to bulk-processed material. Obtaining large diameters of bulk InSb and mercury cadmium telluride (HgCdTe) by growing and pulling a seed crystal is difficult because the crystal is brittle. Noting that this MBE approach accommodates wafers larger than 3-in. diameter, Richard Bredthauer, of Lockheed Martin Fairchild Systems (Tustin, CA), says, "Bulk processing cannot get over 3 inches easily. We are seeing better yield in processing just from our less brittle substrate." He adds, "There is less correction over the arrays for good uniformity," which CQD director Manijeh Razeghi puts at "better than 1% over a 3-in. wafer."

Bredthauer says the MBE material is steadily approaching the performance of bulk material. The latest results for 8-μm layers on 3-in. GaAs and GaAs-coated silicon wafers have a Hall mobility of 65,000 $cm^2/V{\cdot}s$ at 300 K and 92,300 $cm^2/V{\cdot}s$ at 77 K, which, he notes, is one-third to one-half that of bulk InSb. Razeghi adds that the ability to grow the layers on less expensive GaAs will help reduce the cost of the arrays, which can operate over the 3- to 14-μm range.

Laser Focus World *July 1996*