k-Space ASSOCIATES, INC.

APPLICATIONS :: PRODUCTS :: SUPPORT

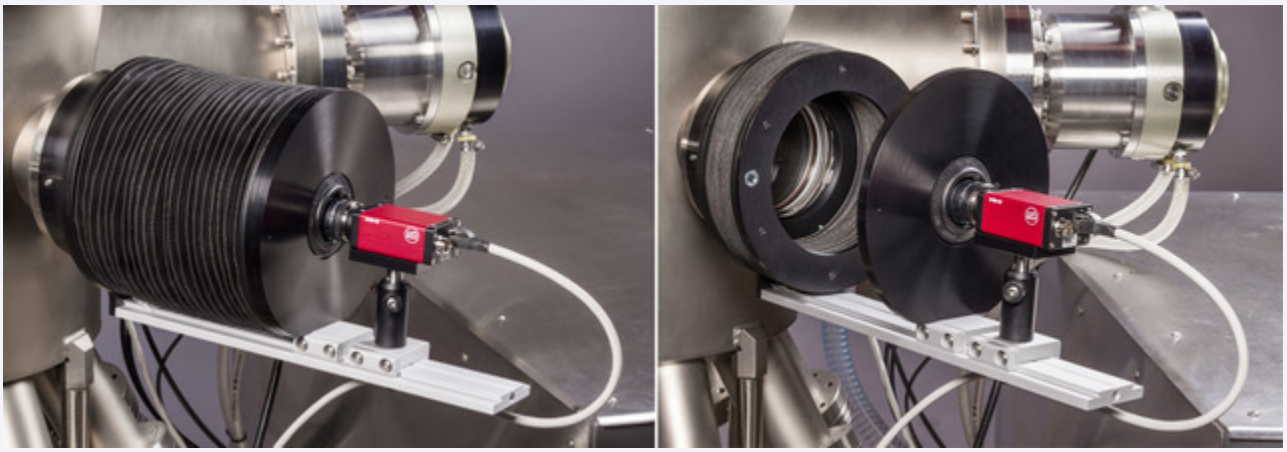
KSA NEWSLETTER UPDATE

Dr. Carrie L. Andre Joins the k-Space Team

k-Space would like to introduce our newest team member, Dr. Carrie L. Andre. Carrie joins us as a Technical Sales Engineer and brings with her semiconductor growth, characterization, and device development experience. Carrie received her Ph.D. in Electrical Engineering from The Ohio State University (an issue that the k-Space staff had to overlook as we are mainly University of Michigan graduates – Go Blue!). At OSU she grew a variety of materials by solid source molecular beam epitaxy (SSMBE) for lattice-mismatched device integration; some examples include low temperature grown GaAs (LT-GaAs), compositionally graded $In_xGa_{1-x}As$ and $In_xAl_{1-x}As$ on InP, and $Al_xGa_{1-x}As$, $In_xGa_{1-x}P$, and $Al_xGa_{1-x}P$ on Group IV substrates (Ge and Si) for photovoltaic applications. With the addition of Carrie to the kSA team, we will be able to improve on the high level of customer service and support you have come to expect from k-Space, while also strengthening our customer-focused new product development. We are excited to have her on the team and hope you join us in welcoming her!

k-Space Announces New kSA 400 Flange Mount Design for MBE, PLD, and Sputtering Systems using RHEED!

k-Space is now offering a new flange design for its kSA 400 Analytical RHEED systems. This assembly features easier camera access, simple adjustment of camera position, and unmatched shielding from stray light. The new magnetic camera/bellows attachment mechanism also allows easy and direct access to view the RHEED screen by eye at any time. The new flange mount is compatible with most RHEED screen viewports and allows for increased air circulation around the CCD for longer camera lifetime. The addition of this new flange mount design means kSA 400 customers can obtain even higher performance and utility from their systems and illustrates kSA's ongoing commitment to the kSA 400 product line, which was first developed over 20 years ago!



kSA ICE system Selected by Naval Research Laboratory (NRL) for In-Situ Metrology on Agnitron MOCVD tool

The Naval Research Laboratory (NRL) has ordered an Agnitron Technology Inc. Gallium Nitride (GaN) MOCVD system. As part of this R&D scale platform, NRL has selected an advanced kSA ICE (Integrated Control for Epitaxy) system for in-situ self-calibrating temperature and reflectance measurement. The kSA ICE system uses an integrated optics design and high speed electronics tailored for real-time MOCVD process monitoring and provides patented self-calibrating temperature measurement and reflectance data for film growth analysis. The kSA ICE metrology tool is integrated into Agnitron's proprietary IMPERIUM-MOCVD™ control software, which enables direct feedback of k-Space-measured temperature, reflectance, and curvature data for integrated process control.

The kSA ICE system is also upgradeable to include absolute band-edge temperature, curvature, stress, and bow measurement capabilities via its modular design. These upgrades can be added after initial purchase, making kSA ICE a "cool" investment for your ever changing metrology needs.

Agnitron Technology, Inc. specializes in developing emerging compound semiconductor material and device technologies into profitable commercial products as well as economical custom MOCVD equipment solutions. Visit www.agnitron.com for more information.

kSA MOS Used to Measure In-Situ Strain Anisotropy In Ordered InGaP2 at the U.S. Department of Energy's National Renewable Energy Laboratory

Understanding and controlling the CuPt ordering in epitaxially grown $InGaP_2$ is essential to the continued development of high performance, reliable, multi-junction solar cells. Dr. Ryan France of the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) in Golden, Colorado recently reported the in-situ measurement of CuPt ordering in MOVPE grown $InGaP_2$ using strain anisotropy. In this research, Dr. France was able to use the kSA MOS system to measure the wafer curvature and thus the strain in his epitaxial films during film growth. Since the kSA MOS system offers a two-dimensional array of laser spots, he was able to measure the wafer curvature in two orthogonal directions simultaneously. By properly aligning his sample to this array, the kSA MOS system measured the curvature in the [-110] and [110] directions. Then, by comparing the difference in curvature in these two directions and calculating the resulting strain anisotropy, he was able to relate these parameters with the ordering parameter and the material bandgap measured ex-situ by X-ray diffraction (XRD) and photoluminescence (PL), respectively. Dr. France believes that "this technique can be used to rapidly determine the growth condition dependence of ordering in III-V alloys and to monitor the order-disorder transitions."

For more details please see Dr. France's article in the Journal of Applied Physics:

"*In situ measurement of CuPt alloy ordering using strain anisotropy",* Ryan M. France, William E. McMahon, Joongoo Kang, Myles A. Steiner, and John F. Geisz, *Journal of Applied Physics*, **115**, 053502, 2014.

Article Location: http://scitation.aip.org/content/aip/journal/jap/115/5/10.1063/1.4863821

NREL website: http://www.nrel.gov/pv/

Visit k-Space at the Following Tradeshows and See Our Products in Action:

2014 SVC TechCon
May 6-7, 2014 in Chicago, Illinois, USA
http://www.svc.org/

41st ISCS and the 26th IPRM
May 11-15, 2014 in Montpellier, France
http://csw2014.org/

5th International Symposium on Growth of III-Nitrides
May 18-22, 2014 in Atlanta, Georgia, USA
http://www.mrs.org/isgn-5/