



**THE 17TH AMERICAN CONFERENCE ON CRYSTAL GROWTH AND EPITAXY**  
 in conjunction with  
**THE 14TH US BIENNIAL WORKSHOP ON ORGANOMETALLIC VAPOR PHASE EPITAXY**  
 and  
**THE 6TH INTERNATIONAL WORKSHOP ON MODELING IN CRYSTAL GROWTH**  
 will be held together  
**AUGUST 9 - 14, 2009, LAKE GENEVA, WISCONSIN**

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**Abstract Details:**

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ACCGE - Nonlinear Optical and Laser Host Materials	08/11	14:15	Maple Lawn C

**Title:**

Mid-infrared frequency conversion in CdSiP<sub>2</sub>

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**Abstract:**

Cadmium silicon phosphide, CdSiP<sub>2</sub> (CSP), is an exciting new nonlinear optical crystal for frequency conversion applications in the mid-infrared. CdSiP<sub>2</sub> is a II-IV-V<sub>2</sub> chalcopyrite (42m) semiconductor which melts congruently at 1133°C. The crystal is transparent from 0.5 to 9.5 microns characterized by extremely low losses in the 3-5mm range: at longer wavelengths it exhibits intrinsic multi-phonon peaks at 7.1mm and 7.65mm and at shorter wavelengths it has

defect-related absorption peaks around 1mm and 2mm which can be eliminated via processing. The high thermal conductivity of CdSiP<sub>2</sub> (13.6 W/mK) makes it attractive for high average power applications, and its birefringence (-0.05) is sufficient for phase-matched frequency conversion of 1mm, 1.5mm, and 2mm solid-state pump lasers. Finally, the recently measured nonlinear coefficient of CdSiP<sub>2</sub> ( $d_{36} = 84.5$  pm/V) is the highest of any new inorganic crystal in almost 40 years. Here we report efficient second harmonic generation (>30% from an uncoated crystal) of a 4.8mm doubled-CO<sub>2</sub> laser as well as a 2mm-pumped optical parametric oscillator (OPO) with a 27% slope efficiency and >300mW output power. We will also present preliminary results for OPOs pumped with 1.064mm (Nd:YAG) and 1.645mm (Er:YAG) lasers.

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