

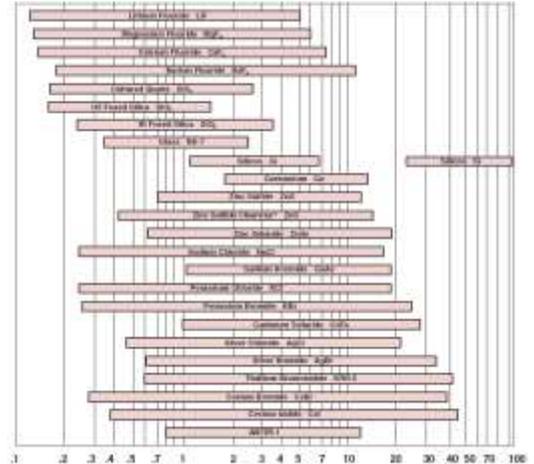


## "Take Your Pick: Choosing optical materials for imaging in the 0.5 to 5.0 $\mu\text{m}$ spectral region"

Harvey M. Spencer, Chief Scientist, DRS Technologies

### In memory of Milton Laikin OSSC Fellow and President

If an optical system could be designed that was capable of imaging continuously over the spectral region spanning the visible to the mid-wave infrared, a single sensor could be used in nearly all weather conditions. The visible band can capture high-resolution video during clear daytime conditions, the short wave infrared takes over during dusk or in the fog, and the mid-wave infrared continues through the night. Logic would say that this is the natural domain for reflective optics, since mirrors have no spectral limitations and introduce no chromatic aberrations. However, when a large field-of-view is desired at a fast f-number, simultaneously achieving good performance and a small, lightweight package is impossible. When turning to glasses which transmit in this extended spectral band, one finds that they are few in number, and most have undesirable physical properties and limited color correction capabilities. The motivation to succeed was high and after much optical design a combination of practical glasses was found. Furthermore, a single detector developed by DRS Technologies has sensitivity from 0.5 to 5.0 micrometers enabling a camera-like sensor to be developed which will seamlessly operate dawn to dusk. This talk will take you through the tradeoffs and decisions along the path to the final design. Key points in the program presented opportunities for the optical designer to suggest modifications to the requirements that made the system possible. Hardware has been built and demonstrated.



**About our speaker:** Harvey M. Spencer has been designing lenses for the aerospace industry for 40 years. He began his career at Hughes Aircraft Company, which later became GM Hughes, and then Raytheon. After the merger of Hughes and Raytheon, a portion of the Hughes operation was required to be divested and became DRS Technologies. Harvey went to DRS and is Chief Scientist, Optics. He has designed numerous optical systems that have gone into production on many diverse platforms including tanks, ships, satellites, and most recently drones and robotic vehicles. He is the author of many papers and holds patents for several optical designs.

A graduate of the Institute of Optics at the University of Rochester, he was fortunate to take classes from Emil Wolf and Rudolf Kingslake. Interestingly, from the time that he joined Hughes to the present, Harvey has not gone on a single job interview, typed a resume, or managed so much as one person!

**Wednesday, November 12, 2014**  
 Reception: 6:00; Dinner: 7:00; Talk: 8:00  
**Cost: \$35. After Nov. 7 - \$45**  
**OSSC Student Members: free, \$15 after Nov 7.**  
**The Proud Bird**  
 11022 Aviation Blvd., Los Angeles, CA 90045  
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 Contact: Kenn Bates, [Events@oss.org](mailto:Events@oss.org),  
 562-634-1435

