



## RAYLEIGH REFLECTORS AND APPLICATIONS

(UTA 13-08)

### Technology Need:

Sub wavelength photonic lattices are of immense interest because of their applicability in numerous optical systems and devices. The Rayleigh irregularity is a prominent phenomenon in optical physics but is widely regarded as substantially useless. It refers to the appearance or disappearance of diffracted spectral orders under a variation of the input light frequency or angle. It is believed that beneficial effects can be obtained by connecting the Rayleigh irregularity phenomenon to the guided mode resonance effect. There are devices and applications that can provide beneficial applications from the Rayleigh irregularity. Conventional grating based diffractive couplers critical to the communications industry and silicon photonics suffer from low efficiencies.

### Solution/ Offering:

Researchers at UT Arlington have developed a new method to produce effective optical components. New class of photonic devices based on dispersion properties of period structures supporting resonant leaky modes as well have been developed, as well as methods for their design and fabrication. The resonant structures may contain one-dimensional, two-dimensional periodic layers or a mixture of the two. The device can be used as input wave is converted to a high efficiency substrate wave propagating at high angles. It can be used in illumination of holograms or other display elements. This device also helps improve the efficiencies of the conventional grating of the diffractive couplers.



### Value Proposition:

- ✓ Innovative concept
- ✓ Many applications can be envisioned
- ✓ No alternative solutions

### Industrial application:

- ✓ Communications Industry
- ✓ Silicon Photonics
- ✓ Optical fiber industry

### Patent Status:

- ✓ Patent Pending  
[WO2014164967 A1](#)

### Current Stage:

- ✓ Prototype design not yet initiated



### Meet the Inventor



Robert Magnusson is the Texas Instruments Distinguished University Chair in Nano Electronics and Professor of Electrical Engineering at UT Arlington. He has served as an associate editor of Applied Optics and Optical Engineering and as general chair for the Diffractive Optics and Micro Optics topical meeting. His area of expertise includes theory and experiment of periodic optical filters, diffractive optics, thin film optics, waveguide optics, holographic interferometry, optical properties of material.

### Contacts:

Rakesh V. Pandit  
202 E. Border Street, Suite 102  
Arlington, TX 76019  
P 817.272.1132  
F 817.272.5808

[rpandit@uta.edu](mailto:rpandit@uta.edu)  
[otm@uta.edu](mailto:otm@uta.edu)