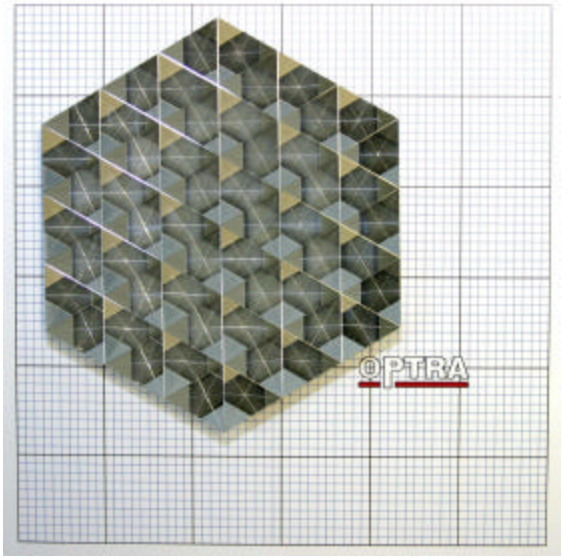
Injection Molded Plastic Retroreflector Array

PRODUCT DESCRIPTION

The plastic injection molded retroreflector array was originally developed for use with an open-path Fourier transform infrared (OP-FTIR) spectrometer. Motivated by a contract to develop a low cost OP-FTIR system, we identified one of the high cost components of traditional systems as being commercially available hollow glass retroreflector arrays. In the effort to significantly reduce this cost, we have developed a novel plastic injection molded technique and an optical design with optimized radiometric efficiency for our application. The effort included a careful tradeoff analysis between retroreflector losses and manufacturability and ultimately produced the optimal size and shape of the individual elements. The arrays are molded in 4.5" × 3.9" modular hexagonal cells which may be assembled into larger arrays. Side by side evaluation of our design with the commercially available state of the art arrays yielded better radiometric performance by the OPTRA design for short standoffs (up to 70m). The performance and significantly lower cost of our retroreflector array makes it an ideal component for any open-path optical monitoring application.



Advantages

- Lightweight
- Modular
- Better geometric efficiency
- Low assembly cost

Applications

- Open Path Spectroscopy
- Remote Sensing
- Tomographic Spectroscopy
- Transportation Safety

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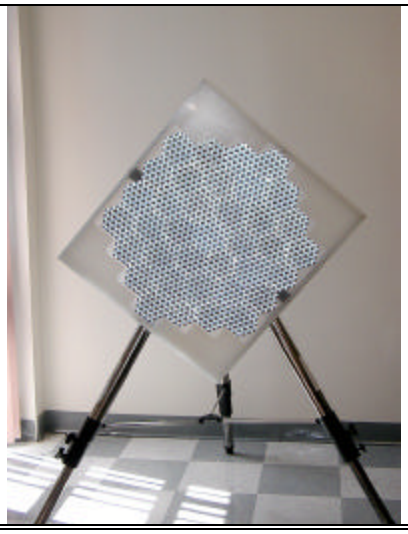
TECHNICAL SPECIFICATIONS

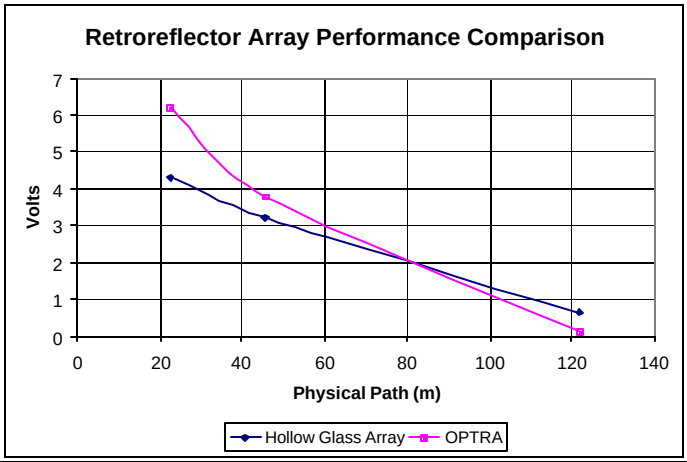
The basic function of the retroreflector is to return energy back to a remote source. The size of the return spot is determined by the size of the individual retroreflector cell, the wavelength of the incident light and the pointing accuracy of the array. The amount of light in the return spot is a function of the coating efficiency and the geometry of the individual cell.

Parameter	***Specification***
Coating Material	Protected Gold *or* Protected Aluminum
Aperture Size	19.2mm
Array Dimensions	4.5" × 3.9"
Pointing Accuracy	±0.1°
Fill Factor	67%
Bevel Losses	15%



Multiple units may be tiled to create large format arrays. The picture to the left shows an assembly of 37 units covering an area of 2800cm^2.

The array shown above was tested in a spectroscopic application against a hollow glass retroreflector array. The OPTRA array performance was better than the more expensive hollow array out to a stand-off of 80 meters.



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