Nullable photons per m² per second, striking the surface per unit area per second. The unit of micro-einsteins (or micromoles) of photons per m² per sec is commonly used for photochemical and photoelectric-like phenomena. This type of parameter is used in photocoagulation, such as in the conversion of light energy for photosynthesis.

Photosynthetic response correlates with the number of photons rather than by energy because, in this photochemical process, each molecule is activated by the absorption of one photon. In photosynthesis, the number of photons absorbed in the 400–700 nm spectral range is estimated and is referred to as photosynthetic active radiation (PAR). PAR is defined in terms of the photosynthetic photon flux density measured in micro-einsteins of photons per m² per sec. PcAR is an equivalent, similarly modeled parameter that has been defined for the photocatalytic processes.

Two methods to measure the PcAR level are being proposed. In the first method, a calibrated spectrometer with a cosine receptor is used to measure the spectral irradiance. This measurement, in conjunction with the photocatalytic response as a function of wavelength, is used to estimate the PcAR. The photocatalytic response function is determined by measuring photocatalytic reactivity as a function of wavelength. In the second method, simple shaped photocatalytic response functions can be simulated with a broad-band detector with a cosine receptor appropriately filtered to represent the spectral response of the photocatalytic material. This second method can be less expensive than using a calibrated spectrometer.

This work was done by Jay Gurecki of Kennedy Space Center; Bob Scully of Johnson Space Center; and Allen Davis, Clay Kirkendall, and Frank Bucholtz of the Naval Research Laboratory. Further information is contained in a TSP (see page 1), KSC-13221.