The Integrating Cavity Absorption Meter (ICAM) provides an excellent means to measure the optical absorption coefficient of pure water. This is due to the long effective path length provided by the high reflectivity walls of the ICAM, as well as its inherent elimination of the effects of scattering [1].

Pope and Fry (1997) were able to demonstrate the ICAM’s effectiveness for 380-700 nm [2]. However, the region from 250-380 nm was still problematic due to a limitation in the reflectivity of the cavity wall materials used in the original ICAM design.

We have developed a new diffuse reflecting material with the highest known reflectivity. The material is a fumed silica powder and has reflectivities of 0.998 at 532 nm, and more importantly 0.996 at 266 nm. This is significantly better than Spectralon, the current industry standard for diffuse reflecting materials, which has reflectivities of 0.991 at 532 nm, and 0.96 at 266 nm. The new material has been further improved by baking the powder under vacuum and backfilling with an inert gas. This was then used to design a new UV-ICAM that can measure the absorption coefficient of pure water from 250-600 nm.

References