Abstract

We propose a low-cost passive method for monitoring long-term average levels of light-absorbing carbon air pollution in polluted indoor environments. Building on prior work, the method here estimates the change in reflectance of a passively exposed surface through analysis of digital images. To determine reproducibility and limits of detection, we tested low-cost passive samplers with exposure to kerosene smoke in the laboratory and to environmental pollution in 20 indoor locations. Preliminary results suggest robust reproducibility (r = 0.99) and limits of detection appropriate for longer-term (~1–3 months) monitoring in households that use solid fuels. The results here suggest high precision; further testing involving “gold standard” measurements is needed to investigate accuracy.

Keywords: household air pollution; indoor air quality; low-cost measurements; time-integrated average; exposure assessment; community monitoring; passive sampling; black carbon; brown carbon; fine particulate matter