SENSOR FOR TESTING LIGHT AND WEATHER RESISTANCE OF SAMPLES

This is a continuation of application Ser. No. 587,826, filed Mar. 9, 1984, now abandoned.

Cross reference to related application, assigned to the assignee of the present application, the disclosure of which is hereby incorporated by reference: U.S. Ser. No. 587,500, filed Mar. 9, 1984, STURM et al, "LIGHT AND WEATHER RESISTANCE SENSING SYSTEM WITH A SENSED SIGNAL TRANSMISSION CHANNEL" now U.S. Pat. No. 4,618,776, issued Oct. 21, 1986. (claiming priority of German Application P. 33 10 631.2-52 of Mar. 24, 1983).

The present invention relates generally to testers for measuring the effect of light and weather on samples of various materials, and more particularly to a revolvable sensor placed in the simulation or test chamber with the samples, whose power supply and signal transmission means do not require external wiring.

BACKGROUND

A sensor, which can be placed in a testing device in the same manner as a sample carrier and exposed to radiation from lamps, is known from sales leaflet D 310 608/2 C5.82/N Ku of the Original Hanau division of the W. C. Heraeus GmbH firm. This sensor is powered by batteries and converts the radiation of a predetermined specific spectral range into corresponding electrical signals and stores away the radiation dose. Upon completion of the test, one can display the desired values by means of a measuring device to be connected to the sensor.

THE INVENTION

It is an object to provide a sensor with an independent power supply which can simultaneously measure various spectral ranges. Another object is to enable continuous measurement during the course of testing the samples.

Briefly, the sensor includes a cylindrical housing translucent to the radiation from lamps to be measured, in which are arranged multiple receptor cells for various respective spectral ranges and a radio transmitter for wireless transmission of signals representing the measurements. Preferably, the housing comprises a quartz glass tube, having at its two ends detachable metal stoppers. The stoppers are preferably provided with gaskets or other packing material where they contact the tube and are connected to each other by means of a threaded central connecting rod. The quartz glass tube preferably includes on its inner surface an infrared absorbing film which, however, transmits sufficient heat waves from the lamps to drive solar cells.

Advantageously, the housing includes at one of its end regions solar cells providing electrical power and a number of receptor cells arranged next to each other along the longitudinal direction of the housing. The sensor receives the radiation given off by lamps and converts the radiation into electrical signals by means of receptor cells. Power is supplied by the solar cells by conversion of the same radiation. The solar cells may also be arranged in the longitudinal direction of the housing in the same row as the receptor cells. Preferably the sensor includes at least one receptor cell for the spectral range of from 300 to 400 nanometers (ultraviolet region) and at least one receptor cell for the spectral range of from 300 to 800 nm (ultraviolet and visible rays). It is desirable to provide four receptor cells for measurement of the radiation in the ultraviolet region, of which one each covers the wave length ranges from 300 to 320 nm, from 330 to 350 nm, from 355 to 375 nm, and from 380 to 400 nm, respectively, while a further receptor cell covers the spectral range from 300 to 400 nm, and yet another receptor cells covers the entire spectral range from 300 to 800 nm. The receptor cells for the four ultraviolet spectrum divisions include an interference filter, an apertured partition, and a diffusing lens in front of a photo cell, and the remaining receptor cells have an interference filter and two diffusing lenses of varying thicknesses in front of a photo cell. The housing preferably includes a connecting terminal for a temperature measurement sensor. The receptor cells are interrogated, producing signals, corresponding to the radiation, whih are combined in the multiplexer and subsequently transmitted serially by frequency modulation in the transmitter.

The sensor of the present invention has the advantage that an immediate measurement can be obtained in the plane of the samples during the testing of the samples and, therefore, one can compare the measurements made in various weathering devices and weather installations.

DRAWINGS

FIG. **1** is a perspective view of the sensor;

FIG. **2** is a longitudinal cross section through the sensor housing;

FIG. **3** shows in cross section two different receptor cell constructions; and

FIG. **4** is a schematic block diagram of the circuit within the sensor.

DETAILED DESCRIPTION

FIG. **1** shows the sensor of the present invention with its housing **1**, comprising a quartz glass tube **4** having at each of its ends a metal stopper **5** with a circumferential gasket, packing or other seal **6**. Within the housing are a row of receptor cells generally given reference numerals **2'**, **2''**, **2'''** disposed along the longitudinal direction of the housing, solar cells **10** and accompanying electronics **16**. In addition, a plug socket is provided on the housing as part of a connection **19** for a temperature measurement sensor **17**, for example Pt 100.

FIG. **2** shows in cross section the components of the housing, including the quartz glass tube **4** with its infrared radiation limiting film or layer **9** and the two stoppers **5** which are preferably of metal and comprise two plates or panels **8** connected to each other by a screw connection **7** such as a threaded rod disposed along the longitudinal axis of the housing. Between the plates **8**, connected to each other by the screw connector **7** and the quartz glass tube **4**, is a gasket **6**, preferably of rubber, which is pressed against the rim of the quartz glass tube **4** as the plates are screwed toward each other on the threaded rod **7**.

As shown in FIG. **3**, the receptor cells **2'** for the four ultraviolet ranges comprise a photo cell, in front of which are arranged an interference filter **12**, an apertured partition **14** and a diffusing lens **13** for cosine correction. The receptor cell **2''** for the entire range and **2'''** for the spectral range covering both ultraviolet and visible light each comprise a photo cell **11**, an interference filter **12** and two diffusing lenses **13**.