Multi-Sample UV Irradiator

- Part 1 Development -

[Background] The on-line UV irradiation/pyrolysis (UV/Py)-GC/MS system consists of a Micro-UV Irradiator (UV-1047Xe) interfaced directly to a GC/MS. The (UV/Py)-GC/MS is designed to evaluate the photo/thermal/oxidative degradation of polymers.[1)] With this system only a single sample can be analyzed at a time. This note describes a Multi-Sample UV Irradiator (UV-1048E) that allows up to 18 samples to be irradiated simultaneously.[2)]

[UV/Py description] The three components of the Multi-Sample UV Irradiator are shown in Fig. 1. The Xe-Hg arc lamp light source is the same as the one used in the single sample irradiator (UV-1047Xe). An optical fiber bundle (fiber diameter = 0.2 mm, 525 fibers) is used to irradiate a large circular area. As shown in Fig. 2, sample cups are placed in the holes in the sample holder. There are six holes in the inner circumference of the double concentric circle and twelve on the outer circumference. The holes are tilted by 7º and point toward the tip of the optical fiber bundle, which improves the UV light irradiation efficiency for each sample. The sample holder can be rotated, and thus, multiple samples are irradiated by UV light at the same time. The temperature of the sample cup holder can be controlled [40 to 80ºC (1ºC step)] and the rotation speed can be controlled from 0 to 8 rpm. The distance from the tip of the optical fiber bundle to the top of the sample cup holder can be varied from 25 to 160 mm. Since the sample temperature, the intensity of the radiation and the time of exposure can be changed, the Multi-Sample UV Irradiator provides the analytical flexibility needed in many degradation studies focused on the effects of UV irradiation of various polymeric materials.

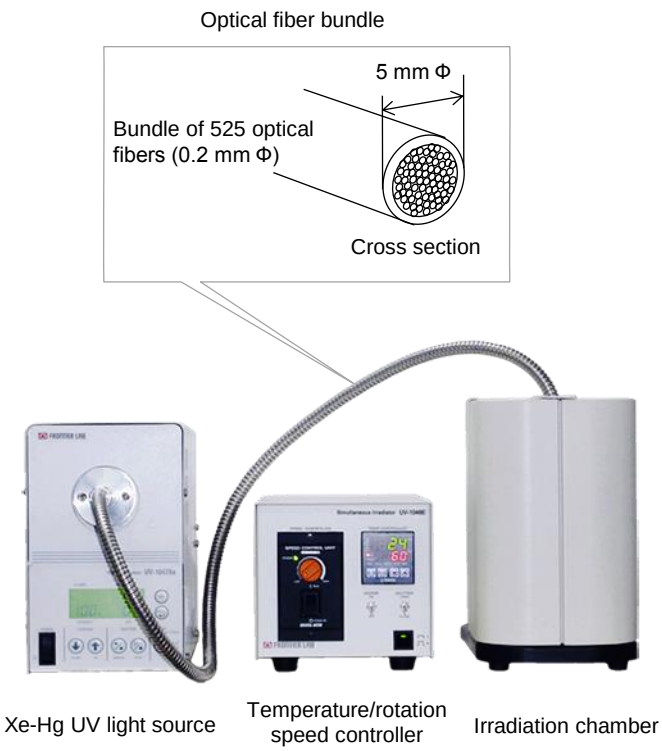

Fig. 1 Multi-Sample UV Irradiator

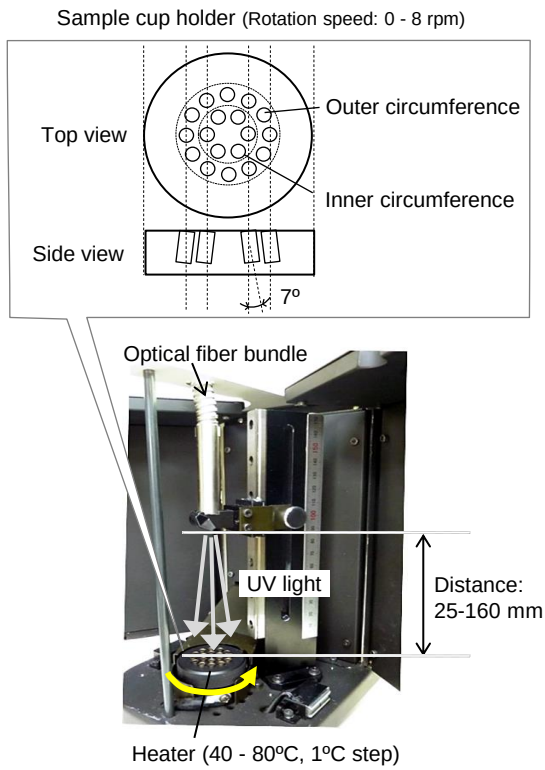

Fig. 2 Irradiation chamber

1) See technical notes PYA5-001E, PYA5-005E, and PYA5-006E.
C. Watanabe *et al.*, *Polym. Degrad. Stab.*, 94 (2009) 1467-1472, T. Yuzawa *et al.*, *Polym. Degrad. Stab.*, 96 (2011) 91-96.
2) K. Matsui *et al.*, *Polym. Test.*, 56 (2016) 54-57.

Keywords : Photo/thermal/oxidative degradation evaluation, Accelerated degradation

Products used : Multi-Sample UV Irradiator, Micro-UV Irradiator

Applications : Weathering test

Related technical notes : PYA5-008E, PYA5-009E

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