electron transfer from the Ru complex photosensitizer into the conduction band of the semiconductor and from the iodine redox mediator to the photosensitizer. The number of electrons produced by one photosensitizer molecule (turnover number) reaches 500 million, corresponding to continuous stability for 10 years under irradiation.

Long-term stability of the DSSC is currently being investigated for commercial applications at EPFL, Solaronix S.A. in Geneva, the Netherlands Energy Research Foundation (ECN), INAP, and NIMC [6, 13, 159, 163, 165–167], shown in Table 15.3. For example, 7000 h of cell stability, which corresponds to 6 years of outdoor use, has been obtained under 1000 $W\,cm^{-2}$ with a UV cutoff filter, as shown in Figure 15.15 [159]. Späth and coworkers conducted DSSC stability tests at Solaronix with polymer-sealed devices containing viscous electrolytes with a high boiling point, such as glutaronitrile [165]. They discovered that no significant degradation of stability occurred over a period of 9600 h of continuous illumination at 35°C, indicating chemical stability of components and a physically stable seal using polymer materials. In addition, long-term stability of a small cell for more than 10 000 h has also been accomplished under no UV light conditions at 17°C at 2.5 suns using an electrolyte of 0.5 M LiI, 0.05 M I_2, and 0.3 M TBP in methoxypropionitrile [163]. Stability tests under UV irradiation have also been carried out [167]. Addition of MgI_2 to the electrolyte can significantly improve stability to UV light, resulting in stable PV performance for more than 1500 h under UV irradiation [167]. A detailed mechanism of the UV-stabilizing effect due to MgI_2 has not been elucidated.

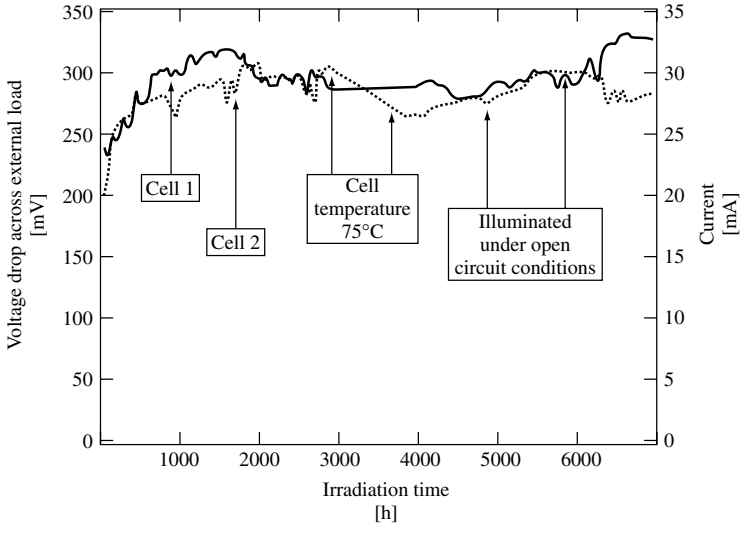

Figure 15.15 Stability test carried out with two sealed DSSCs over 7000 h of continuous illumination with visible light (polycarbonate 395-nm cutoff filter) at 1000 Wm^{-2} light intensity. The photocurrent and voltage drop measured across an external load resistor of 10 Ω are plotted as a function of irradiation time. Cell 1 (solid line) was continuously illuminated at 35°C; the same for cell 2 (broken line) except that it was operated for a 700-h period at 75°C and for 1000 h at open circuit. Reproduced from Kohle O, Grätzel M, Meyer A, Meyer T, *Adv. Mater.* **9**, 904–906 (1997) by permission of Wiley-VCH, STM-Copyright & Licenses [159]