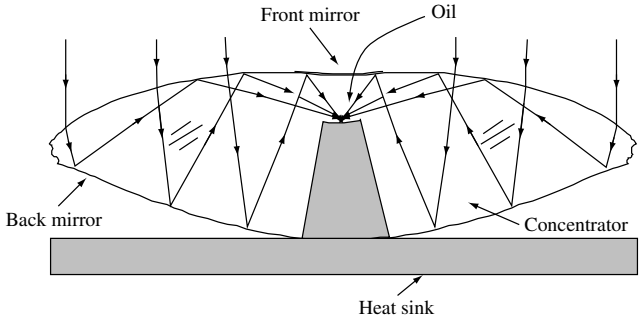

Figure 11.36 The RXI concentrator cross section. This version has an acceptance angle of 2.7° and a concentration of 1000X, and is close to ideal. Minano J, Gonzalez J, Zanesco I, Flat High Concentration Devices, *First World Conference on Photovoltaic Energy Conversion* © 1994 IEEE

concentrator shown in Figure 11.36 [64]. The name RXI comes from the fact that the lens uses refraction, reflection (denoted by X), followed by internal reflection. This device can be thought of as a two-axis version of the prism concentrator that relies on total internal reflection and that has been fine-tuned for optimum performance. The result is a very shallow device using a minimum of dielectric material. It is most suited for small apertures, and hence very small cells, so that the overall thickness and volume of material is minimized.

Other innovative concentrators include the D-SMTS (Dielectric-Single Mirror Two Stage) trough, which incorporates refractive secondaries into a reflective trough primary lens [65]. This device, whose cross section is shown in Figure 11.37, achieves one-axis concentration of 30X with a high acceptance angle of 2.44°. This is close to an ideal concentrator, which would give 2.87° acceptance angle at 30X and $n = 1.5$.

11.4.10 Issues in Concentrator Optics

The preceding sections discuss the theoretical aspects of designing PV concentrating optics. The designer is also faced with difficult materials and manufacturing issues.

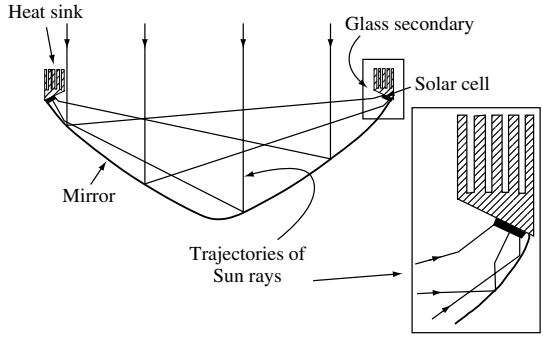

Figure 11.37 Cross section of the D-SMTS reflective trough concentrator. Reproduced from Mohedano R, Benitez P, Perez F, Minano J, "Design of a Simple Structure for the D-SMTS Concentrator", Presented at *16th European Photovoltaic Solar Energy Conference* (Glasgow, UK, 2000) by permission of WIP [65]