Table 21.8 Module materials cost drivers, GaAs tandem-junction cells [5]

	Substrate (GaAs & Ge = 4″, Si = 6″)			
	GaAs	Single-crystal Ge	Polycrystalline Ge	Si
Wafer cost/each	\$360.46	\$64.37	\$23.62	\$29.94
Material	*Percentage of total module materials cost*			
Wafer	59.8	20.4	8.6	5.3
Module box (\$3.59/each)	6.9	13.2	15.1	17.4
Heat sink (\$0.52/each)	4.0	7.7	8.8	10.1
Fresnel lens (\$4.07/ft^2)	12.2	23.3	26.8	14.3

Source: © 1994 IEEE

about 9% of the module materials cost. The latter case is very similar to the materials cost contributions for the Si module, where the wafer cost is not the largest single contributor. Using Ge wafers would thus be a major step in making GaAs cells competitive.

When the module prices in Table 21.7 are incorporated into the 50-MW power plant, capital requirements (Table 21.5) by adjusting these costs for the changes in field size resulting from the GaAs conversion efficiencies, the cost of energy generated, expressed as LEC, can be calculated for the various cell structures in Table 21.7 (see Figure 21.7). These GaAs-based energy-production costs are compared to that of Si-based energy-production costs from the previous study [4] as summarized in Table 21.6. Since none of the GaAs module prices, ranging from \$741 to \$413, is as low as the Si module price of \$328, the LECs in Figure 21.7 essentially show the trade-off of the more efficient (27.5% to 35%) but higher cost GaAs modules with the less efficient (27.4%) but lower

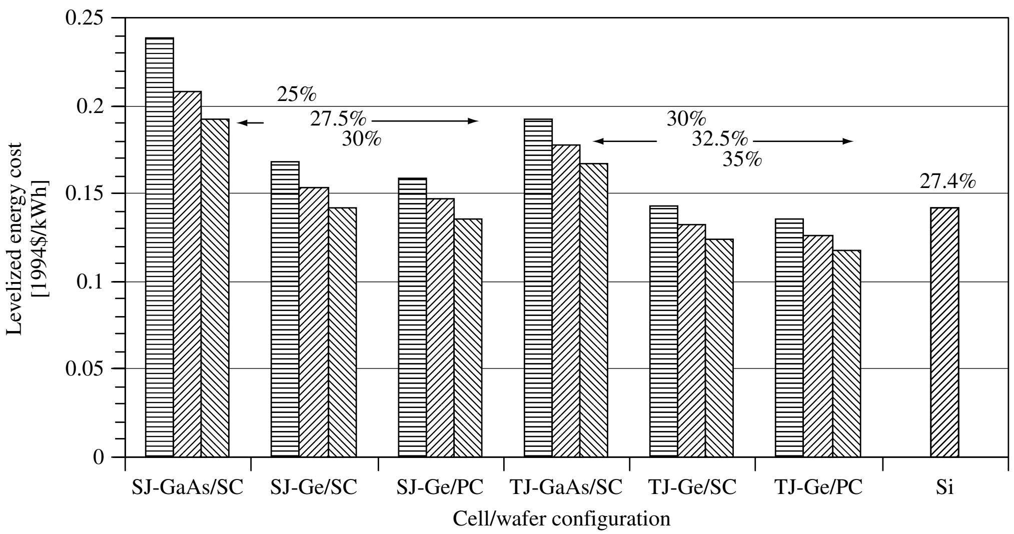

Figure 21.7 Cost of energy produced by 50 MW central station Fresnel lens plants using GaAs cells [5]. © 1994 IEEE