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Germanium films were deposited by the low pressure (approximately 20-55 Torr) pyrolytic decomposition of germane on substrates held at various temperatures, T_s , in the range of 635 to 700 K. Optical properties: absorption coefficient and the refractive index; electronic properties: conductivity and activation energy, and the X-ray diffraction pattern on these films were determined. The films deposited at or below approximately 660 K are amorphous with an optical gap of 1.0 eV. This is the first report of the preparation of a-Ge via CVD. The absorption profile of the films resembles that reported for sputtered or evaporated films deposited at elevated temperatures or exposed to a long-term anneal. Films deposited at or above 660 K are partially crystallized (pc-Ge), with crystallite size and extent of the crystallization increasing with increasing T_s . The deposition of CVD a-Ge resembles in many ways the deposition of CVD a-Si, but at temperatures 270 K lower. The rate of Ge deposition is activated ($\Delta E = 28$ Kcal/mole). Amorphous Ge:X (X = B, C, etc.) alloys have also been prepared and characterized. These materials may find utility in solar spectrally selective absorbers. From the point of view of solar absorptance, germanium is superior to silicon and amorphous germanium and some of its alloys are superior to crystalline germanium. The high temperature stability of a-Ge:X alloy will also be addressed. Our results show that the superior absorptance of amorphous germanium may be employed in producing selective surfaces with the advantage of CVD fabrication.

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