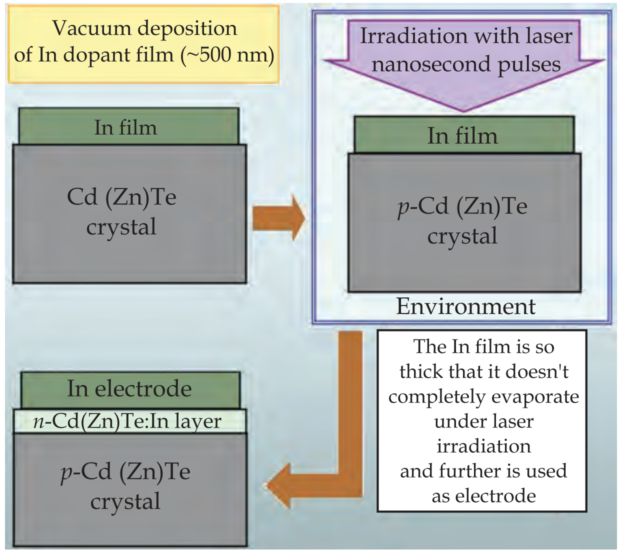
TECHNIQUE FOR LASER-INDUCED SOLID-PHASE DOPING OF NANOLAYERS IN CD(ZN)TE CRYSTALS AND FORMATION OF *p-n* JUNCTION

Specification

As a result of laser irradiation of *p*-Cd(Zn)Te crystal pre-coated with a dopant film, the nanolayer is doped heavily and an abrupt *p-n* junction is formed.

p-Cd(Zn)Te crystals, resistivity, Ohm · cm	$10^9 - 10^{10}$
Dopant film thickness, nm	~500
Environment at irradiation	Vacuum ~1 Pa, argon ~0.3 MPa, liquid
Laser:	
wavelength, nm	248, 532, 694
pulse duration, ns	7 – 8, 20
energy density, mJ/cm^2	80 – 150
Doped layer:	
thickness, nm	30 – 60
electron concentration, cm^{-3}	~10^{19}
resistivity, Ohm · cm	$10^{-2} - 10^{-3}$



Flowchart of processes of laser-induced solid-phase doping of *p*-Cd(Zn)Te crystal nanolayer with In dopant and formation of *p-n* junction

Advantages

There are no analogs in Ukraine. As compared with the foreign counterparts, the advantages are as follows: a high charge carrier concentration in the doped semiconductor nanolayer due to the introduction of electrically active dopant and suppression of its self-compensation effect, as well as the rate, accuracy, and manufacturability of abrupt *p-n* junction formation

Areas of Application

The technique is to be used for the heavy doping of a thin surface semiconductor region, the formation of an inverse layer and abrupt *p-n* junction, and the creation of In/Cd(Zn)Te/Au diode structures for X/γ-ray radiation detection

IPR Protection

IPR2, IPR3

Stage of Development. Suggestions for Commercialization

IRL4, TRL5
Manufacturing application of the technology

Contact Information

Anna S. Stanetska, V.Ye. Lashkaryov Institute of Semiconductor Physics of the NAS of Ukraine;
+38 044 525 60 43, +38 099 292 66 60, e-mail: stanetska_anna@ukr.net