

Bulk Growth of CdZnTe dedicated to substrates for HgCdTe epilayers

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To achieve high performance infrared sensor based on mercury cadmium telluride (MCT) technology, the epilayer must be of very good quality, with a reduced dislocation density, and a low defect density. Bulk cadmium zinc telluride (CdZnTe) is considered to be the ideal substrate for HgCdTe epitaxy, owing to the possibility to adapt the lattice constant of the substrate with that of the layer by varying the zinc concentration. Furthermore, the development of megapixel resolution infrared focal plane array (IRFPA) requires the production of large dimension substrates, which implies an increase in the ingot diameter. In addition, it is necessary to supply these large CdZnTe substrates while keeping a very high crystalline quality of the material in terms of absence of subgrain boundary, low dislocation density, homogeneity of the zinc distribution and low micro-defect density. The substrates must also be well oriented: (111) for liquid phase epitaxy and (211) for molecular beam epitaxy. And finally, another point to consider is surface preparation of these substrates, which has an important effect on the epilayer quality.

This presentation gives the opportunity to show our improvements concerning the bulk growth of CdZnTe which address the crystal quality and size issues required for today's infrared device development. The CdZnTe material properties are presented using different characterization techniques. In addition, we report the progress obtained thanks to the implementation of a chemical-mechanical polishing (CMP) process.