

Principal Researcher	Kazuo Nakajima			Number of Researchers	4	
Research Institution · Department · Title	Professor, Institute for Materials Research, Tohoku University			Location of Institution	Sendai	
Title of Project	Growth of SiGe bulk single crystals with low defect density and creation of functional heterostructures					
Abstract of Research Project	<p>Owing to the globalization of materials for device applications, absence of substrates, which are suitable for the growth of thin films, often hampers realization of desired performance. This problem could be solved if we could establish a technology to grow multicomponent bulk crystals for substrates. We have already developed in-situ monitoring system of the position and temperature of the crystal/melt interface, and applied the system to grow SiGe bulk crystals with uniform composition by controlling the growth temperature during growth. However, for realization of strain-controlled functional heterostructures on SiGe substrates, further improvement of crystal quality is required. In this research, we attempt to develop a new technique to realize high-quality SiGe bulk single crystals based on the combination of floating-zone method and multicomponent zone-melting method with in-situ monitoring. Furthermore, we utilize SiGe as a substrate for subsequent epitaxy for strain-controlled functional heterostructures.</p>					
References	<p>Y. Azuma, N. Usami, T. Ujihara, G. Sazaki, Y. Murakami, S. Miyashita, K. Fujiwara, and K. Nakajima, "Growth of SiGe bulk crystal with uniform composition by directly controlling the growth temperature at the crystal-melt interface using in situ monitoring system", J. Crystal Growth, <b>224</b>, 204-211 (2001). K. Nakajima, T. Kusunoki, Y. Azuma, N. Usami, K. Fujiwara, T. Ujihara, G. Sazaki, and T. Shishido, "Compositional variation in Si-rich SiGe single crystals grown by multi-component zone melting method using Si seed and source crystals", J. Crystal Growth, <b>240</b>, 373-381 (2002).</p>					
Term of Project	Fiscal years 2002-2006. (5years)					
Budget Allocation (in thousand of yen)	FY2002	FY2003	FY2004	FY2005	FY2006	TOTAL
	45,400	26,600	6,600	7,100	7,900	93,600
Homepage Address	<a href="http://www.xtalphys.imr.tohoku.ac.jp/">http://www.xtalphys.imr.tohoku.ac.jp/</a>					