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# Elastic Constants of $(Ti_{1-x}V_x)_2O_3$ at Low Temperatures*

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Measurements have been made of the velocities of 30 MHz ultrasonic waves in single crystal samples of $(Ti_{1-x}V_x)_2O_3$ with $0 \leqslant x \leqslant 0.10$ which allow some of the elastic constants to be determined from $T = 1.5$ K up to either 80, 120, or 300 K. For $Ti_2O_3$—which is a narrow gap semiconductor below about 400 K—$C_{11}$ and $C_{33}$ have temperature dependences explainable by lattice anharmonicity. The $C_{11}$, $C_{33}$, and $C_{44}$ measured for samples with $x \geqslant 0.02$ are smaller than for $Ti_2O_3$, and $C_{11}$ and $C_{33}$ of such samples are less $T$ dependent than for $Ti_2O_3$. It appears that vanadium causes negative electronic contributions to $C_{11}$ and $C_{33}$ since computer calculations show that the latter can arise as a consequence of the ultrasonic stress shifting a narrow $e_g$ vanadium impurity band relative to the wide $a_{1g}$ Ti 3-$d$ band which it overlaps

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