

**substance: chromium sesquioxide (Cr<sub>2</sub>O<sub>3</sub>)**  
**property: phonon wavenumbers, elastic moduli**

**wavenumbers of lattice modes**

IR active modes

(ν/c) <sub>TO</sub> (E <sub>u</sub> )	305 cm <sup>-1</sup>	RT, $E \perp c$	for the space group D <sub>3d</sub> <sup>6</sup> – R $\bar{3}c$ seven Raman active and six IR active modes exist	65R, 77L
	440 cm <sup>-1</sup>			
	538 cm <sup>-1</sup>			
	609 cm <sup>-1</sup>			
(ν/c) <sub>TO</sub> (A <sub>2u</sub> )	402 cm <sup>-1</sup>	RT, $E \parallel c$		
	533 cm <sup>-1</sup>			

Raman active modes

(ν/c) <sub>R</sub> (E <sub>g</sub> )	235 cm <sup>-1</sup>	$T \approx 330$ K		71H
	290 cm <sup>-1</sup>			
	352 cm <sup>-1</sup>			
	528 cm <sup>-1</sup>			
	617 cm <sup>-1</sup>			
(ν/c) <sub>R</sub> (A <sub>2g</sub> )	266 cm <sup>-1</sup>			
	547 cm <sup>-1</sup>			

For  $T < T_N$  two new features appear; broad second-order scattering from 500...900 cm<sup>-1</sup> with peak at 685 cm<sup>-1</sup> and a sharp feature at 396 cm<sup>-1</sup>. Latter is ascribed to zone-centre optical magnon [71H].

**elastic moduli**

$c_{11}$	3.74·10 <sup>12</sup> dyn cm <sup>-2</sup>	RT	trigonal system	76A
$c_{12}$	1.48·10 <sup>12</sup> dyn cm <sup>-2</sup>			
$c_{13}$	1.75·10 <sup>12</sup> dyn cm <sup>-2</sup>			
$c_{33}$	3.62·10 <sup>12</sup> dyn cm <sup>-2</sup>			
$c_{44}$	1.59·10 <sup>12</sup> dyn cm <sup>-2</sup>			
$c_{66}$	– 0.19·10 <sup>12</sup> dyn cm <sup>-2</sup>			

**References:**

- 65R     Renneke, D. R., Lynch, D. W.: Phys. Rev. 138 (1965) A530.
- 71H     Hart, T. R., Aggarwal, R. L., Lax, B.: Light Scattering in solids, Balkanski, M. (ed.), Paris: Flammarion Press 1971.
- 76A     Alberts, H. L., Boeyens, J. C. A.: J. Mag. Magn. Mater. 2 (1976) 327.
- 77L     Lucovsky, G., Sladek, R. J., Allen, J. W.: Phys. Rev. B16 (1977) 4716.