

MPG No. 32.4.121 $m\bar{3}m'$ [Type III, cubic] [Q tensor]

* Rank 0 tensor.

$$[Q]$$

$$Q = Q_s^{(1)}$$

* Rank 1 tensor. * Rank 2 tensor (s).

$$\begin{bmatrix} Q_{xx} & 0 & 0 \\ 0 & Q_{xx} & 0 \\ 0 & 0 & Q_{xx} \end{bmatrix}$$

$$Q_{xx} = Q_s^{(1)}$$

* Rank 2 tensor (a). * Rank 3 tensor (s). * Rank 3 tensor (a). * Rank 4 tensor (sss).

$$\begin{bmatrix} Q_{xxxx} & Q_{xxyy} & Q_{xxyy} & 0 & 0 & 0 \\ Q_{xxyy} & Q_{xxxx} & Q_{xxyy} & 0 & 0 & 0 \\ Q_{xxyy} & Q_{xxyy} & Q_{xxxx} & 0 & 0 & 0 \\ 0 & 0 & 0 & Q_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & Q_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & Q_{yzyz} \end{bmatrix}$$

$$Q_{xxxx} = 2Q_g^{(1)} + Q_s^{(1)} + 2Q_s^{(2)}$$

$$Q_{xxyy} = -Q_g^{(1)} + Q_s^{(1)}$$

$$Q_{yzyz} = -Q_g^{(1)} + Q_s^{(2)}$$

* Rank 4 tensor (ssa). * Rank 4 tensor (aas).

$$\begin{bmatrix} Q_{yzyz} & 0 & 0 \\ 0 & Q_{yzyz} & 0 \\ 0 & 0 & Q_{yzyz} \end{bmatrix}$$

$$Q_{yzyz} = Q_s^{(3)}$$

* Rank 4 tensor (aaa). * Rank 4 tensor (sa). * Rank 4 tensor (as). * Rank 4 tensor (s).

$$\begin{bmatrix} Q_{xxxx} & Q_{xxyy} & Q_{xxyy} & 0 & 0 & 0 & 0 & 0 & 0 \\ Q_{xxyy} & Q_{xxxx} & Q_{xxyy} & 0 & 0 & 0 & 0 & 0 & 0 \\ Q_{xxyy} & Q_{xxyy} & Q_{xxxx} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & Q_{yzyz} & 0 & 0 & Q_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & Q_{yzyz} & 0 & 0 & Q_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & Q_{yzyz} & 0 & 0 & Q_{yzyz} \end{bmatrix}$$

$$Q_{xxxx} = 2Q_g^{(1)} + Q_s^{(1)} + 2Q_s^{(2)}$$

$$Q_{xxyy} = -Q_g^{(1)} + Q_s^{(1)}$$

$$Q_{yzyz} = -Q_g^{(1)} + Q_s^{(2)}$$

* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & Q_{yzyz} & 0 & 0 & -Q_{yzyz} & 0 & 0 \\ 0 & 0 & 0 & 0 & Q_{yzyz} & 0 & 0 & -Q_{yzyz} & 0 \\ 0 & 0 & 0 & 0 & 0 & Q_{yzyz} & 0 & 0 & -Q_{yzyz} \end{bmatrix}$$

$$Q_{yzyz} = Q_s^{(3)}$$

* Rank 4 tensor (t).

$$\begin{bmatrix} Q_{xxxx} & 0 & 0 \\ 0 & Q_{xxxx} & 0 \\ 0 & 0 & Q_{xxxx} \\ 0 & 0 & Q_{yyzz} \\ Q_{yyzz} & 0 & 0 \\ 0 & Q_{yyzz} & 0 \\ 0 & Q_{yyzz} & 0 \\ 0 & 0 & Q_{yyzz} \\ Q_{yyzz} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$Q_{xxxx} = 2Q_g^{(1)} + 3Q_s^{(1)}$$

$$Q_{yyzz} = -Q_g^{(1)} + Q_s^{(1)}$$