

MPG No. 29.2.110  $m\bar{3}1'$  [ Type II, 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).

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

$$Q_{xxyy} = 4G_{f3}^{(1)}$$

\* 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).

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

$$Q_{yzyz} = G_{f3}^{(2)}$$

\* Rank 4 tensor (as).

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

$$Q_{yzyz} = G_{f3}^{(3)}$$

\* Rank 4 tensor (s).

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

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

$$Q_{xxyy} = 4G_{f3}^{(1)} - Q_g^{(1)} + Q_s^{(1)}$$

$$Q_{xxzz} = -4G_{f3}^{(1)} - Q_g^{(1)} + Q_s^{(1)}$$

$$Q_{yzyz} = G_{f3}^{(2)} - Q_g^{(1)} + Q_s^{(2)}$$

$$Q_{yzyz} = -G_{f3}^{(2)} - Q_g^{(1)} + Q_s^{(2)}$$

\* Rank 4 tensor (a).

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

$$Q_{yzyz} = G_{f3}^{(3)} + Q_s^{(3)}$$

$$Q_{yzyz} = G_{f3}^{(3)} - Q_s^{(3)}$$

\* Rank 4 tensor (t).

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

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

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