

MPG No. 15.3.55 4/m'mm [ Type III, tetragonal ] [M tensor]

\* Rank 0 tensor. \* Rank 1 tensor. \* Rank 2 tensor (s). \* Rank 2 tensor (a).

$$\begin{bmatrix} 0 & M_{xy} & 0 \\ -M_{xy} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$M_{xy} = T_{pz}^{(1)}$$

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

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & M_{xxx} \\ 0 & 0 & 0 & 0 & 0 & -M_{xxx} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ M_{xxx} & -M_{xxx} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxx} = M_{gaz}^{(1)}$$

\* Rank 4 tensor (ssa).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & M_{xxx} \\ 0 & 0 & 0 & 0 & 0 & -M_{xxx} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & M_{yzz} & 0 \\ 0 & 0 & 0 & -M_{yzz} & 0 & 0 \\ -M_{xxx} & M_{xxx} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxx} = -2T_{faz}^{(1)} + 2T_{pz}^{(1)}$$

$$M_{yzz} = -4T_{faz}^{(1)} - T_{pz}^{(1)}$$

\* Rank 4 tensor (aas). \* Rank 4 tensor (aaa).

$$\begin{bmatrix} 0 & M_{yzz} & 0 \\ -M_{yzz} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$M_{yzz} = -T_{pz}^{(2)}$$

\* Rank 4 tensor (sa).

$$\begin{bmatrix} 0 & 0 & M_{xxx} \\ 0 & 0 & M_{xxx} \\ 0 & 0 & M_{zzy} \\ 0 & M_{yzz} & 0 \\ M_{yzz} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxx} = -T_{faz}^{(2)} + T_{pz}^{(3)}$$

$$M_{zzy} = 2T_{faz}^{(2)} + T_{pz}^{(3)} + 2T_{pz}^{(4)}$$

$$M_{yzz} = -T_{faz}^{(2)} + T_{pz}^{(4)}$$

\* Rank 4 tensor (as).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & M_{yzz} & 0 \\ 0 & 0 & 0 & M_{yzz} & 0 & 0 \\ M_{xyxx} & M_{xyxx} & M_{xyzz} & 0 & 0 & 0 \end{bmatrix}$$

$$M_{yzzx} = -T_{faz}^{(3)} + T_{pz}^{(6)}$$

$$M_{xyxx} = -T_{faz}^{(3)} + T_{pz}^{(5)}$$

$$M_{xyzz} = 2T_{faz}^{(3)} + T_{pz}^{(5)} + 2T_{pz}^{(6)}$$

\* Rank 4 tensor (s).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & M_{xxx}y & 0 & 0 & M_{xxy}x \\ 0 & 0 & 0 & 0 & 0 & -M_{xxy}x & 0 & 0 & -M_{xxx}y \\ 0 & 0 & 0 & 0 & 0 & M_{zzy}y & 0 & 0 & -M_{zzy}x \\ 0 & 0 & 0 & 0 & M_{yzz}x & 0 & 0 & M_{yzz}x & 0 \\ 0 & 0 & 0 & -M_{yzz}x & 0 & 0 & -M_{yzz}x & 0 & 0 \\ M_{xyxx} & -M_{xyxx} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxx}y = M_{gaz}^{(1)} - 2T_{faz}^{(1)} - T_{faz}^{(2)} + 2T_{pz}^{(1)} + T_{pz}^{(3)}$$

$$M_{xxy}x = M_{gaz}^{(1)} - 2T_{faz}^{(1)} + T_{faz}^{(2)} + 2T_{pz}^{(1)} - T_{pz}^{(3)}$$

$$M_{zzy}y = 2T_{faz}^{(2)} + T_{pz}^{(3)} + 2T_{pz}^{(4)}$$

$$M_{yzz}x = -4T_{faz}^{(1)} - T_{faz}^{(2)} - T_{pz}^{(1)} + T_{pz}^{(4)}$$

$$M_{yzz}x = -4T_{faz}^{(1)} + T_{faz}^{(2)} - T_{pz}^{(1)} - T_{pz}^{(4)}$$

$$M_{xyxx} = M_{gaz}^{(1)} + 2T_{faz}^{(1)} - 2T_{pz}^{(1)}$$

\* Rank 4 tensor (a).

$$\begin{bmatrix} 0 & 0 & 0 & 0 & M_{yzz}x & 0 & 0 & M_{yzz}x & 0 \\ 0 & 0 & 0 & M_{yzz}x & 0 & 0 & M_{yzz}x & 0 & 0 \\ M_{xyxx} & M_{xyxx} & M_{xyzz} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$M_{yzz}x = -T_{faz}^{(3)} - T_{pz}^{(2)} + T_{pz}^{(6)}$$

$$M_{yzz}x = -T_{faz}^{(3)} + T_{pz}^{(2)} + T_{pz}^{(6)}$$

$$M_{xyxx} = -T_{faz}^{(3)} + T_{pz}^{(5)}$$

$$M_{xyzz} = 2T_{faz}^{(3)} + T_{pz}^{(5)} + 2T_{pz}^{(6)}$$

\* Rank 4 tensor (t).

$$\begin{bmatrix} 0 & M_{xxx}y & 0 \\ -M_{xxx}y & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ M_{xxx}y & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & -M_{xxx}y & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$M_{xxx}y = M_{gaz}^{(1)}$$