We also recorded the Mueller matrix of the set up with the glass substrate only. Up to a normalization factor we deduced

$$\mathcal{M}^{\text{glass}} = \begin{pmatrix} \underline{1.0000} & 0.0060 & -0.0040 & -0.0070 \\ -0.0030 & \underline{0.9851} & -0.0010 & 0.0020 \\ -0.0020 & 0.0020 & \underline{0.9965} & 0.0030 \\ -0.0050 & -0.0040 & 0.0030 & \underline{0.9821} \end{pmatrix} \quad (4)$$

which satisfies $\mathcal{M}^{\text{glass}} \simeq \mathcal{I}$ with $\mathcal{I}$ the identity matrix. It implies that the optical set up do not induce depolarization and that consequently we can rely on our measurement procedure for obtaining $\mathcal{M}$.

VI. APPENDIX C: THEORETICAL MUELLER MATRICES.

The precise form of the theoretical Mueller matrice ${\mathcal{M}_{\mathcal{L}}}^{\text{th.}}$ deduced from equation (1) is

$${\mathcal{M}_{\mathcal{L}}}^{\text{th.}} = \begin{pmatrix} \mathcal{M}_{00}^{\text{th.}} & \mathcal{M}_{01}^{\text{th.}} & \mathcal{M}_{02}^{\text{th.}} & \mathcal{M}_{03}^{\text{th.}} \\ \mathcal{M}_{01}^{\text{th.}} & \mathcal{M}_{11}^{\text{th.}} & \mathcal{M}_{12}^{\text{th.}} & \mathcal{M}_{13}^{\text{th.}} \\ \mathcal{M}_{02}^{\text{th.}} & \mathcal{M}_{12}^{\text{th.}} & \mathcal{M}_{22}^{\text{th.}} & \mathcal{M}_{23}^{\text{th.}} \\ -\mathcal{M}_{03}^{\text{th.}} & -\mathcal{M}_{13}^{\text{th.}} & -\mathcal{M}_{23}^{\text{th.}} & \mathcal{M}_{33}^{\text{th.}} \end{pmatrix}. \quad (5)$$

with $\mathcal{M}_{00}^{\text{th.}} = (2|A|^2 + |B|^2 + |C|^2)/2$, $\mathcal{M}_{01}^{\text{th.}} = Re[BA^* + AC^*]$, $\mathcal{M}_{02}^{\text{th.}} = Im[AB^* + CA^*]$, $\mathcal{M}_{03}^{\text{th.}} = (|C|^2 - |B|^2)/2$, $\mathcal{M}_{11}^{\text{th.}} = |A|^2 + Re[B^*C]$, $\mathcal{M}_{12}^{\text{th.}} = Im[B^*C]$, $\mathcal{M}_{13}^{\text{th.}} = Re[AC^* - BA^*]$, $\mathcal{M}_{22}^{\text{th.}} = |A|^2 - Re[B^*C]$, $\mathcal{M}_{23}^{\text{th.}} = Re[CA^* - AB^*]$, $\mathcal{M}_{33}^{\text{th.}} = (2|A|^2 - |B|^2 - |C|^2)/2$. Similar formula are obtained for ${\mathcal{M}_{\mathcal{R}}}^{\text{th.}}$ after permuting B and C.

From the previous relations we deduce the useful equations (valid for ${\mathcal{M}_{\mathcal{L}}}^{\text{th.}}$)

$$\begin{aligned} B/A &= \frac{\mathcal{M}_{01}^{\text{th.}} - \mathcal{M}_{13}^{\text{th.}}}{\mathcal{M}_{00}^{\text{th.}} + \mathcal{M}_{33}^{\text{th.}}} + i\frac{\mathcal{M}_{23}^{\text{th.}} - \mathcal{M}_{02}^{\text{th.}}}{\mathcal{M}_{00}^{\text{th.}} + \mathcal{M}_{33}^{\text{th.}}} \\ C/A &= \frac{M_{01}^{\text{th.}} + M_{13}^{\text{th.}}}{M_{00}^{\text{th.}} + M_{33}^{\text{th.}}} + i\frac{\mathcal{M}_{23}^{\text{th.}} + \mathcal{M}_{02}^{\text{th.}}}{\mathcal{M}_{00}^{\text{th.}} + \mathcal{M}_{33}^{\text{th.}}}. \end{aligned} \quad (6)$$

Together with equation (3) equation (6) allow us to fit B/A and C/A if we replace $\mathcal{M}^{\text{th.}}$ by ${\mathcal{M}_{\mathcal{L}}}^{\text{exp.}}$ (a similar procedure is applicable to ${\mathcal{M}_{\mathcal{R}}}^{\text{exp.}}$ after permuting B and C).