

Technical information

Measurement mode M3

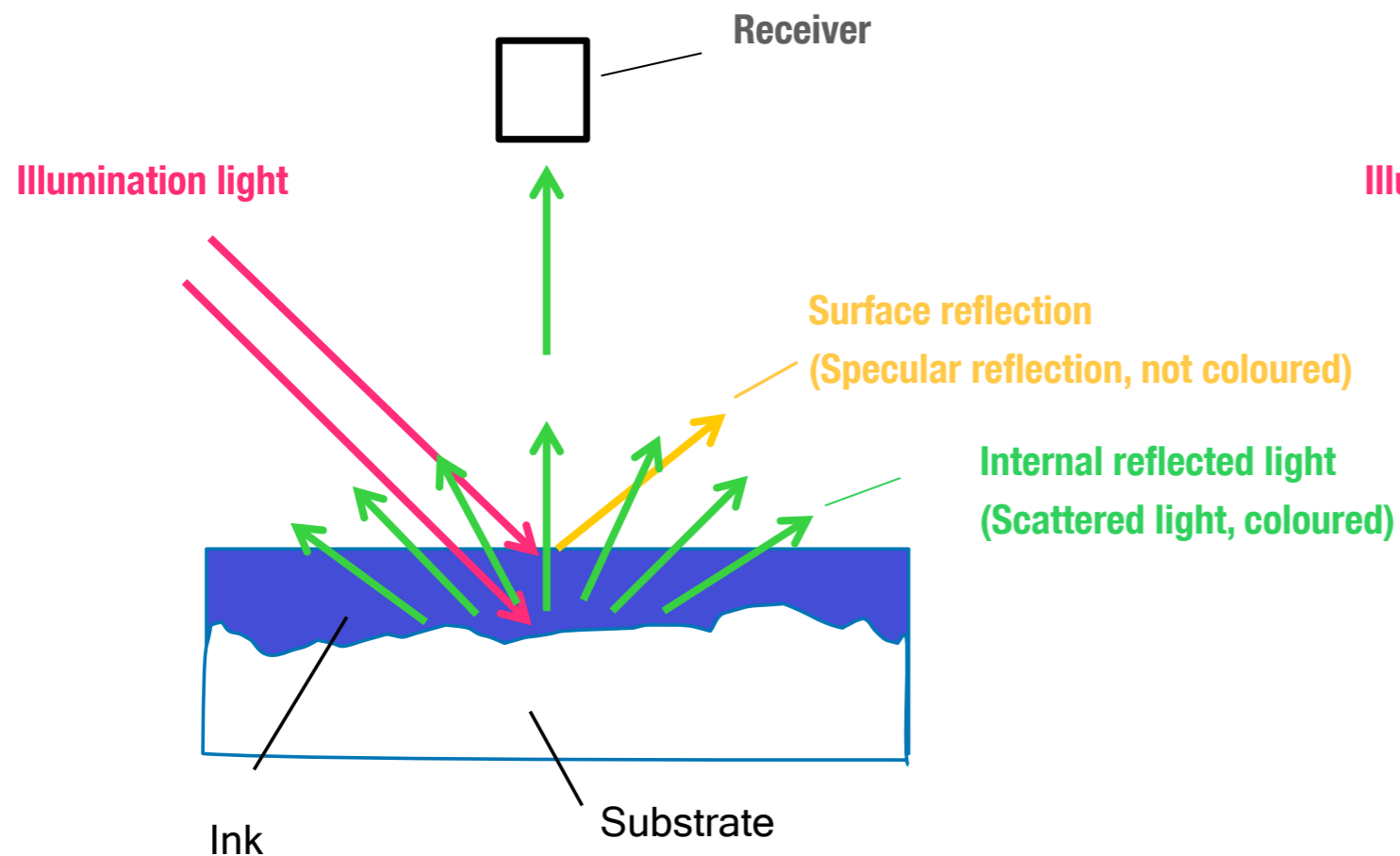
Topics



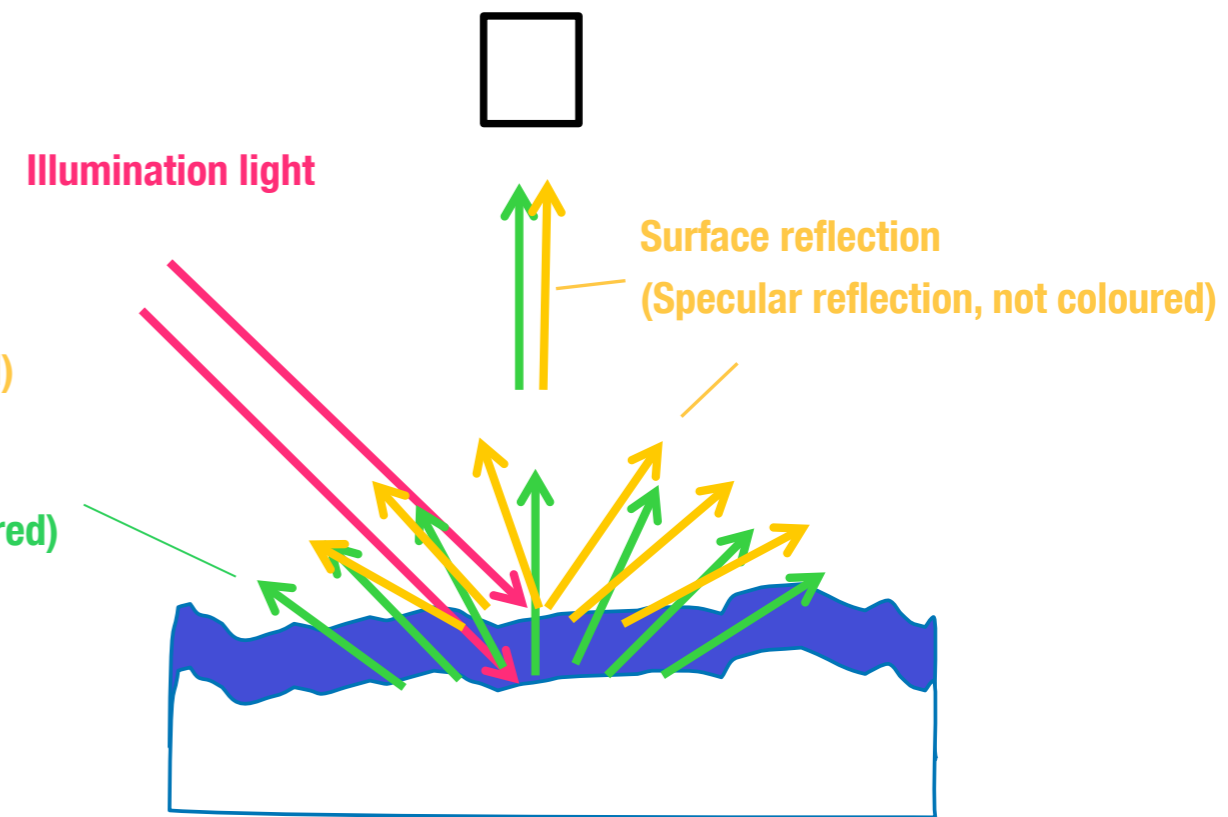
- Reasons for Density differences between wet and dry offset print known as „Dry-back“
- Solution: Polarization filters
- Performance of polarization filters

Dry-back leads to surface differences

- The reflection densities measured after drying get lower than immediately after printing. This phenomenon is called Dry-down or Dry-back.



- Immediately after printing, the ink's surface is flat and smooth (glossy) due to the liquidity of the ink and its surface tension. Therefore the internal reflected light is received by the receiver, but the surface reflected light goes off due to Specular reflection.

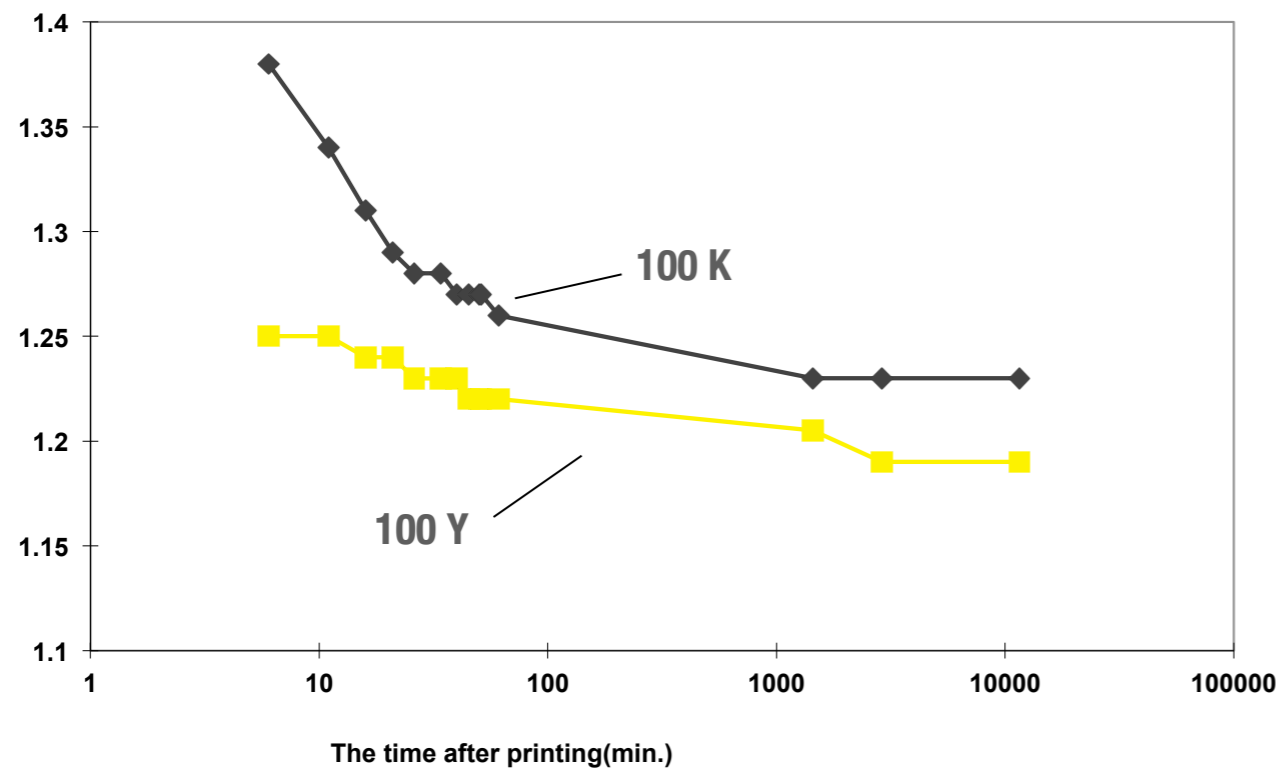


- After drying, the surface reflection turns scattered because the ink's liquidity disappears and the ink's surface becomes uneven. The received light contains parts of the surface reflected light and the internal reflected light. Thus the densities get lower than before drying.

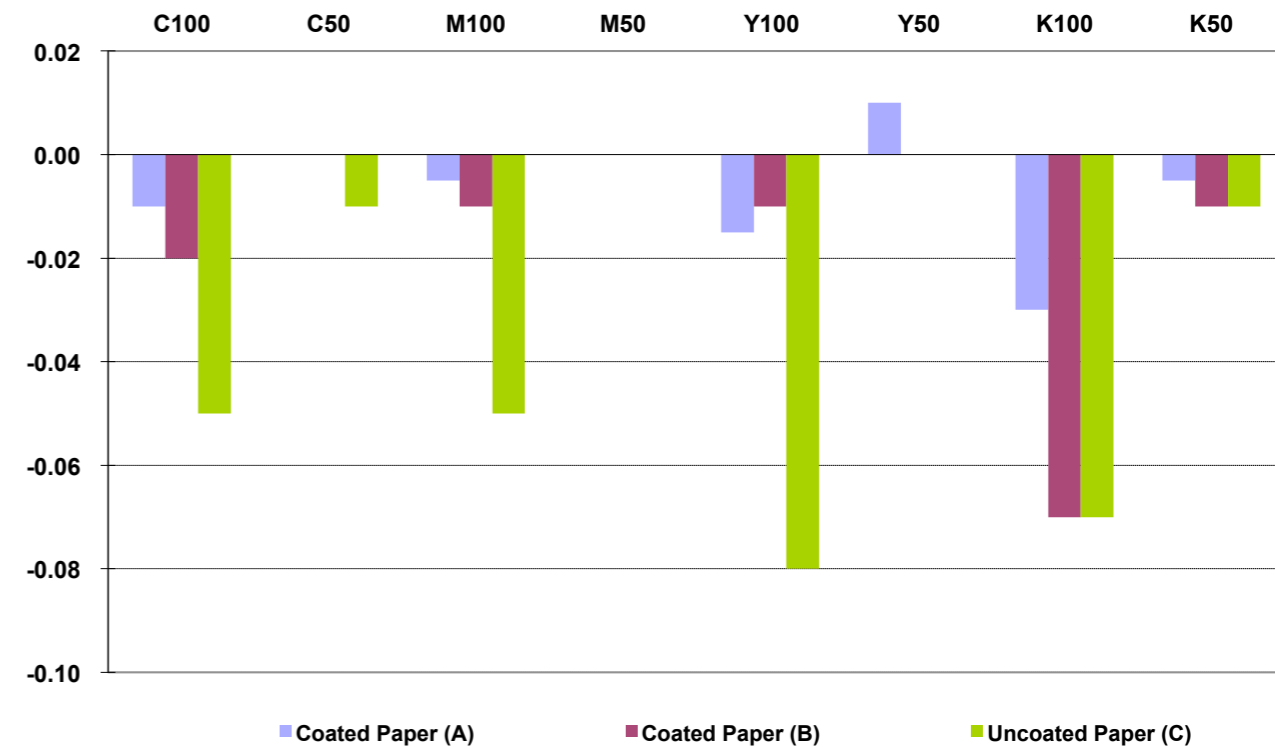
Actual data of the dry-back effect

- The Dry-back effect is most significant until appr. 60 minutes after printing. (See the left figure.)
- The Dry-back effect slightly occurs on coated papers with a smooth and flat surface and is significant on uncoated papers whose surface is matte. (See the right figure.)

Change of density due to Dry-back on certain uncoated paper



Diff. of density from dry to wet cond.

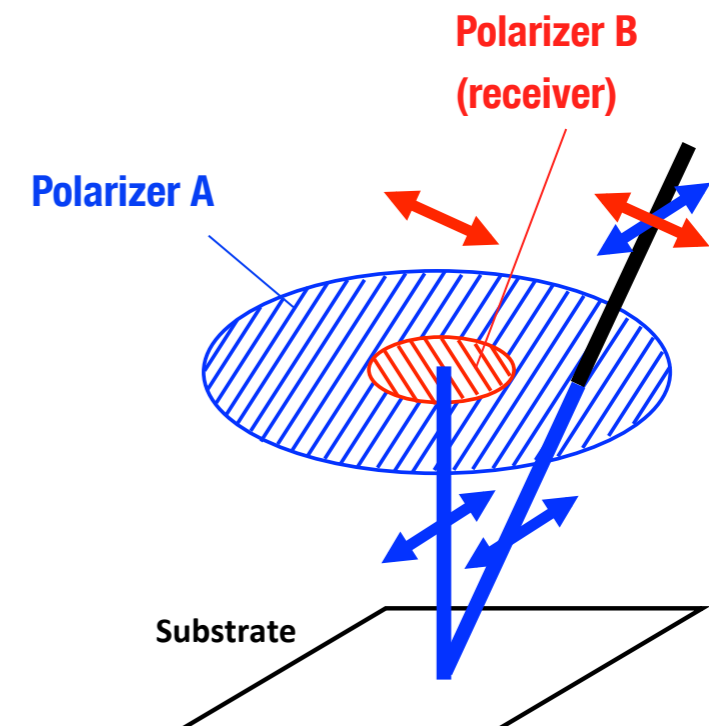


- Test condition: Konica Minolta FD-7, measurement condition M0, Status E

- Wet condition: immediately after printing (within 15 min.)
- Dry condition: 1 day after printing

Solution: Polarization filters

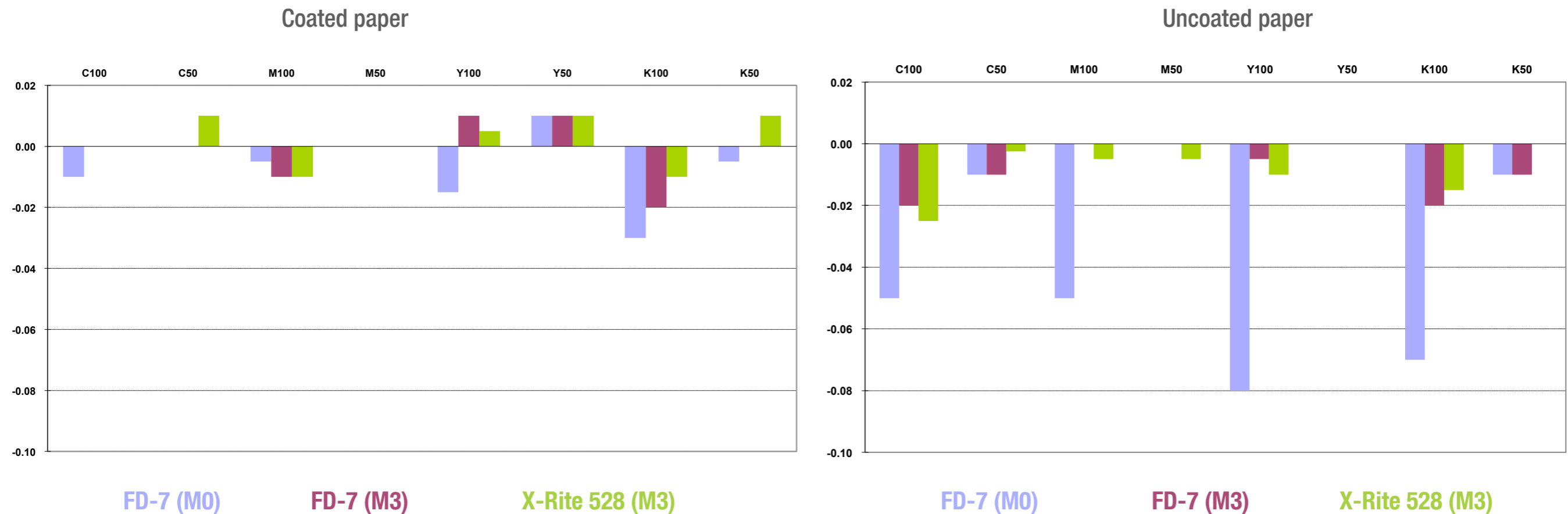
- The illumination light is linearly polarized.
- The polarization of the internal reflected light from the substrate is broken because of scattering reflection, while the surface reflected light keeps the polarization because of specular reflection.
- By inserting 2 polarizing filters as shown in the below figure, the polarizer B, which is placed orthogonally to the polarizer A, prevents the surface reflected light from reaching the receiver while the scattered light reaches the receiver.
- Thus, the reflection densities excluding the surface reflected light by the ink can be measured independent of the change of the ink's surface condition (wet or not).
- Using measurement with polarizing filters, the measured densities are almost the same immediately after printing and after dry-back.
- According to ISO 13655:2009, the measurement condition using polarizing filter is called M3.
- M3 should not be applied for color assessment of the final product (dry condition), because the surface reflected light is needed for the measurement.



Actual data of pol-filter performance

- Dry-back occurs more remarkably in the measurement of uncoated (matte) paper than coated paper as shown in the result of FD-7 (M0 = no polfilter).
- Reduction of the measured density due to dry-back can be mostly suppressed by using M3 measurement with the polarizing filters.

- Differences of densities from dry to wet



- Wet condition: immediately after printing (within 15 min.)
- Dry condition: 1 day after printing

Actual data of pol-filter performance 2

- The densities in M3 are generally higher than ones in M0, M1 and M2, because the M3 measurement is made by mostly eliminating the surface reflected light by using the polarizing filters. M0, M1 and M2 measurements include all the reflected light including the surface reflected light.
- Reduction of density due to dry-back is mostly suppressed by using M3 measurement.

