Introduction to NCU OCT instruments

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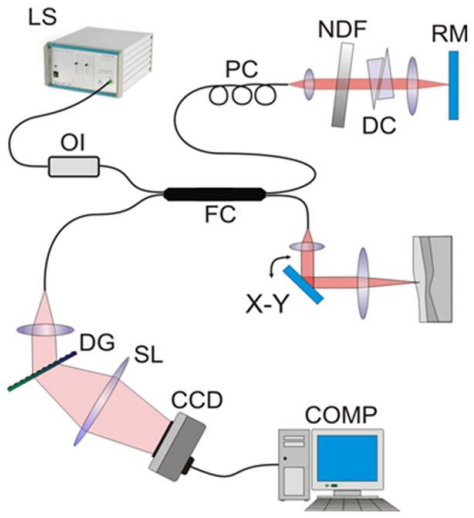
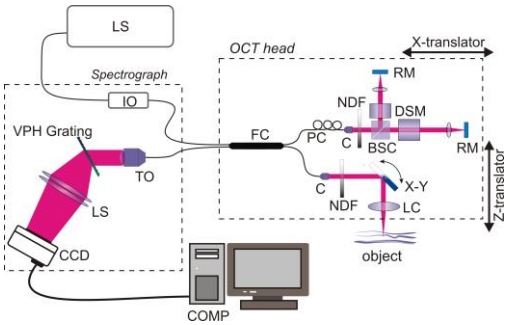
Both instruments to be used in hand-un training were built in the Institute of Physics, Department of Physics, Astronomy and Informatics N. Copernicus University firstly under grants on Polish Ministry of Science and Higher Education (Instrument I) and then under EU Community's FP7 Research Infrastructures programme under the CHARISMA Project (Grant Agreement 228330 – Instrument II).

Instrument I (developed by: IG, MG, TB, MSz, PT)



- Instrument type: spectral domain OCT
- Detector system: diffraction grating spectrometer with linear CCD detector
- Light Source: Broadlighter D855 (Superlum, Ireland) 780 – 920 nm
- Power at object: 600 – 1500 μW
- Axial (in-depth) resolution in varnish.: $\delta z = 4.5$ μm
- Transverse (in-plain): δx ~15 μm
- Sensitivity: 108 dB (80 – 110 dB)
- Distance to the object: 65 mm
- Field of view: 20 x 20 mm
- A/D converter: 12 bits
- Acquisition rate:
  - 40 μs/A-scan
  - 0.2 s / 2D image (cross section, 5000 A-scans)
  - OCT movie: 16 frames/s x 1200 A-scans
  - real time monitoring: 2 frames/s x 400 A-scans

Instrument II (developed by: ASz, MSz, MS, ŁC, EAK, PT)



- Instrument type: spectral domain OCT
- Detector system: diffraction grating spectrometer with linear CCD detector
- Light Source: Broadlighter Q-870-HP (Superlum, Ireland) 770 – 970 nm
- Power at object: 800 μW
- Axial (in-depth) resolution in varnish.: $\delta z = 2.2$ μm
- Transverse (in-plain): $\delta x = 6.2 / 12.4$ μm
- Distance to the object: 43 / 7.5 mm
- Field of view: 17 x 17 mm / 5 x 5 mm
- Sensitivity: 100 dB
- A/D converter: 12 bits
- Acquisition rate:
  - 40 μs/A-scan
  - 0.2 s / 2D image (cross section, 5000 A-scans)

REFERENCES

description of instrument I

1. P. Targowski, M. Iwanicka, L. Tymińska-Widmer, M. Sylwestrzak, E.A. Kwiatkowska "Structural Examination of Easel Paintings with Optical Coherence Tomography", *Accounts of Chemical Research* **43**(6), 826-836 (2010)
2. P. Targowski, B.J. Rouba, P. Karaszkiewicz, M. Iwanicka, L. Tymińska-Widmer, T. Łękawa-Wysłouch, E.A. Kwiatkowska, M. Sylwestrzak "Optyczna Koherentna Tomografia OCT – nowe narzędzie do działań konserwatorskich i inwentaryzacyjnych / Optical Coherence Tomography OCT – a novel tool for art conservation and cataloguing" - with nonauthorised translation by the Editor, materiały konferencji REMO2008,*Wiadomości konserwatorskie* **26** 94-107 (2009)

description of Instrument II

1. Piotr Targowski, Magdalena Iwanicka, Marcin Sylwestrzak, Ewa A. Kaszewska, Cecilia Frosinini "OCT structural examination of 'Madonna dei Fusi' by Leonardo da Vinci" Proc. SPIE **8790** (2013)