November 12-13 2024
RamanFest
Paris | FRANCE

Karolina Turczyńska[1]
Paulina Filipczak[1], Ireneusz Kotela[2], Andrzej Kotela[2], Marta Grodzik[3], Tadeusz Diem[4], Krzysztof Matyjaszewski[1,5], Xavier Banquy[6], Jacek Ulański[1], Marcin Kozanecki[1]
[1]Department of Molecular Physics, Lodz University of Technology, Zeromskiego 116, 90-924 Lodz, Poland
[2]National Medical Institute of the Ministry of Interior and Administration, Woloska 137, 02-507 Warsaw, Poland
[3]Department of Nanobiotechnology, Warsaw University of Life Sciences, Ciszewskiego 8, 02-786 Warsaw, Poland
[4]Collegium Civitas, Defilad 1, 00-901 Warsaw, Poland
[5]Department of Chemistry, Carnegie Mellon University, 4400 Fifth Avenue, Pittsburgh, PA 15213, United States
[6]Canada Research Chair in Bio-inspired Materials and Interfaces, Faculty of Pharmacy, Université de Montréal, Montréal Qc H3T1J4 QC, Canada

karolina.socha@dokt.p.lodz.pl

Portable Raman Spectrometer – future diagnostic tool in cartilage tissue damage

Alterations in cartilage structure can disrupt joint function and affect tribological properties. These changes can lead to degeneration of joint surfaces and the development of orsteoarthritis, which is a major cause of disability worldwide [1]. Evaluating cartilage degradation in joints is crucial for diagnosing osteoarthritis progression. Although there are diagnostic methods like X-rays and MRI, there are no accurate techniques detecting the early stages of osteoarthrisis.
Raman spectroscopy is emerging as a valuable tool for analyzing tissue surfaces, which could be helpful in establishing the link between the structure of articular cartilage and the progression of degeneration [2]. Previous research indicates that Raman spectroscopy can successfully identify damaged tissues. The versatility of the technique may enable clinical applications. Spectrometer equipped with a probe, could allow for assessment of cartilage degradation during arthroscopy. In this study the human articular cartilage with varying levels of degradation was obtained during joint replacement surgeries from different patients. Preliminary *ex vivo* findings on animal and human cartilage tissue using a fiber-optic Raman probe suggest its potential for diagnosing osteoarthritis.

References

[1] G. Peat , *et al.*, Osteoarthritis and Cartilage, 2 (2021) 180-189.
[2] E. Pavlou, *et al.*, Annals of Joint, 3 (2018) 83.

The research was conducted as a part of the project project EuroNanoMed III ENM3/IV/CaPreCon/2021 while KT was a PhD Candidate at IDS TUL.