Fingerprints are unique patterns formed on our fingers that can not only identify us but also hold hidden secrets in the form of genetic material. The Fingerprint DNA Mapping Project is a groundbreaking approach that combines forensic genetics with advanced spectroscopic techniques to open up new possibilities for personal identification. Traditional laboratory methods for examining DNA from biological samples are not only time-consuming but also require a high level of laboratory experience.

Our proposed approach presents a scheme of activities at the molecular level that will lead us to develop potential materials, methods, and procedures for personal identification. Jigsaw ID will be the first dual-modal identification in a spectroscopic system by analyzing optically active material with a biocompatibility function with evidence in the form of small amounts of DNA in fingerprint traces. The project will be interdisciplinary, involving physicists, biophysicists, forensic chemists, materials engineers, biologists, anthropologists, lawyers, and forensic scientists. Our work will include optimizing polymeric hydrogel tapes for their suitability in stabilizing DNA trace and fingerprint evidence. One of the most important aspects for the development of this process will be the variability of the substrate, which has a variety of structural variants due to the diverse needs of the site environment, such as paper, glass, metal surfaces, etc. We will adapt our materials to the needs of the forensic environment – compatibility with post-mortem skin and sweat/fat components, taking into account the possibility of performing identification analysis at mass disaster sites, with full respect for human rights. Another goal is to develop polymeric hydrogel tapes that are completely safe for people working with them - the materials we will use will be non-toxic and environmentally compatible.

This project is based on the cooperation of Polish and foreign scientists. Experts from the USA specialize in spectroscopic methods of DNA trace analysis, while researchers from Gdansk deal with spectroscopic methods and procedures for dactyloscopic trace visualization. Combining competence and experience will allow us to understand and develop the potential of these novel methods of dactyloscopic trace visualization.