Blood Types Identification Using Photons

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Free-space broadband frequency modulated near infrared (NIR) photon transmission mode technique has been used in this paper as an optical bio-sensor method to extract optical properties of different blood types. The NIR system measures broadband (30MHz-1000MHz) insertion loss (IL) and insertion phase (IP) of modulated selected photons at certain wavelength (680, 795, 859nm). Haemoglobin in general contains three components; red blood cells (RBC), white blood cell (wbc) and platelets. All three formalize the haemoglobin in the human body and Blood groups are identified by antigens and antibodies. Antigens are proteins located on the surface of the red blood cells (RBC), while antibodies are proteins located in the plasma. Blood samples from 30 patients are collected and examined using the developed optical NIR system. The study is divided into two stages: The first stage is dedicated to performing IL and IP measurements over 30MHz-1000MHz in a transmission measurement method to characterize the behaviour of modulated photons and extract optical properties of blood samples using inverse problem solving algorithm. The second stage is dedicated to analysing the result in order to future identify blood types without any laboratory ABO Typing. The results show a promising novel method to identify different blood types in-vitro using optical sensing that gives instantaneous result and saves time.

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