The metabolism of cancer cells differs from that of their normal counterparts in its reliance on aerobic glycolysis followed by fermentation to produce lactate. This observation was reported by Otto Warburg nearly one century ago and bears his name, the Warburg Effect. Tumors depend on this alteration to support rapid cellular growth. One novel direction of biomedical research aims at exploiting the reliance of tumors on aerobic glycolysis to control or suppress their growth. Both fundamental and pharmacological research in this context require analytical methods that can quantitatively monitor the formation and consumption of multiple metabolites in time and space by individual cells. With the present project we want to develop the use of microscopy with infrared light as an analytical platform that can satisfy all these demands. In the context of basic research, we will use the technique to test current hypothesis on cellular metabolism and on its relationship to the onset of malignancy. We will also translate its application to pharmacological studies and demonstrate its validity in the preliminary screening of drug candidates.