

## Abstract

In past time, people had a meal with bread and water, but now more and more attention to fine. In recent years, having a lot of fairly serious food safety issues such as meat contained clenbuterol, beverages were made with chemical materials, restaurants used recycled oil to cook, alcoholic drink was made by industrial alcohol and milk powder contained melamine ..... etc. Among these, oil is the most closely related in our daily lives. Normal clean oil has a specific refractive index. After high temperature frying or cooking, oil will be infiltrated with water and it will cause oil to be acidified. Then oil becomes a kind of poison to human and also carcinogen.

The purpose of this study is using plastic fiber optic SPR elements to detect the changes of refractive index of oil. Find out the interconnectedness between acidification degree and SPR signal. On the production of elements, we use the side-polished way to partially polish optical fiber. On the optical fiber, we coat with a layer of gold as a plasma resonance region. Then we produce a sensing element which can sense the change of refractive index. General acid value of edible vegetable oil provides important information including quality and purity when oil was

processed and stored. The method we use is mixing vegetable oil which contains oleic acid with methanol and converting to the change of refractive index. We found that when the content of oleic acid is 10% or less SPR wavelength did not change significantly. When the content of oleic acid is 20%~80% that will cause SPR wavelength shift 10nm. Additionally, in order to verify the accuracy of the experiment, we also use the titration of AOCS to measure acid value. With this study, we expect to make inspection of oil becomes cheaper, more immediate and easier.