



POTENTIAL OF MIXED *Zingiber officinale* AND *Garcinia atroviridis* AS A TREATING MEDIUM FOR USED COOKING OIL

M. H. M. Hafidzal^{1,2}, M. Z. M. Razi², A. Hamzah^{1,2}, N. H. Razak^{1,2}, N. I. Zulkafli^{1,2}, M. F. B. Abdollah^{1,2}, S. A. Shamsudin^{1,2} and A. Roslizar^{1,2}

¹Centre for Advanced Research on Energy, Universiti Teknikal Malaysia Melaka, Durian Tunggal, Melaka, Malaysia

²Faculty of Mechanical Engineering, Universiti Teknikal Malaysia Melaka, Durian Tunggal, Melaka, Malaysia

E-Mail: razalihlim@yahoo.com

ABSTRACT

This study was undertaken to explore the potential of mixed *Zingiber officinale* and *Garcinia atroviridis* as a treating medium for used cooking oil. The used cooking oil was treated in two stages. First, it was heated together with *Zingiber officinale* until the temperature at the in the range of 170 °C to 220 °C for 10 minutes. In the next stage, the *Garcinia atroviridis* was then put into the treated cooking oil for 24 hours. The purity and the clarity index of the sample were observed using Fourier Transform Infrared (FTIR) and Ultraviolet (UV) spectrometers. The results show that the FTIR curve of used cooking oil after treated with mixed *Zingiber officinale* and *Garcinia atroviridis* has a similar characteristic with new cooking oil. Besides, the higher absorbency indicates that the clarity index of treated oil is better than that of used oil. The results presented here may facilitate demonstration of *Zingiber officinale* and *Garcinia atroviridis* as a new treating medium for used cooking oil.

Keywords: used cooking oil, *Zingiber officinale*, *Garcinia atroviridis*.

INTRODUCTION

Commonly in Malaysia, cooking oil is made by plants such as palm oil, peanut oil, corn oil and others. According to the Malaysia oil palm statistic, palm oil is most widely used in the world as cooking oil due to its free artery clogging trans-fat. Cooking oils are used as heat transfer medium during cooking [1]. Besides that, it is a common practice in our society to reuse used cooking oil repeatedly. There are some reasons behind this practice. The perception from people which believes that reuse used cooking oil is more delicious and to save money are the most significant [2]. Upon heating, cooking oil will experience chemical reactions, hydrolysis, oxidation and polymerization process [3]. Besides that, during the frying process, cooking oil will undergo degradation reaction caused by water, air and heat [4]. The amount of degradation increases with the continuously heating of cooking oil at high temperature. As a result, it forms free fatty acids, hydroperoxides and polymerized triglycerides which are toxic to the human body [5]. In addition, it causes viscosity increases, cooking oil colour change to more darker and unpleasant flavor and smell. Besides that, cooking oil forms soot which is contains polycyclic aromatic hydrocarbons (pahs) when in frying process (centre for food safety). According to soot causes global air warming and affect the human health [6]. There are many research have been done in order to increase the quality of used cooking oil. [2] used bagasse as absorbent to recover used cooking oil and the result shows the color of oil is reduced and become brighter. Besides that, [7, 8, 9] did the experiments by using silica gel, magnesium oxide and aluminum hydroxide gel.

Therefore, the objective of this study is to explore the use of natural adsorbent: *Zingiber officinale* and *Garcinia atroviridis* to treat and recover used cooking oil [10]. Recycling of disposed and used cooking oil is

expected to reduce waste disposal problem and increases prospect of awareness to protect the ecosystem. *Zingiber officinale* or ginger is famous in medicine and spice for cooking. According to America Cancer Society (ACS) ginger is found out to be one of cancer treatment [11]. [12] did a research about the potential of ginger. He found out that ginger can react as antioxidant. Besides that, in the ginger contains polyphenol compounds which have high antioxidant activity [13]. *Garcinia atroviridis* or "asam keeping" in Malay also well known as medicine and spice. Similar like ginger, asam keeping also is found out as antioxidant activity [14]. It is because asam keeping contains fruity acids such as citric acid, malic acid and tartaric acid.

EXPERIMENTAL TEST

In this work, two stages of oil treatment for used cooking oil were performed using mixed *Zingiber officinale* and *Garcinia atroviridis*, as shown in Figure-1. First, the *Zingiber officinale* was put into the used cooking oil and heated between 170 °C to 220 °C for 10 minutes. The solution was filtered prior to mix with the *Garcinia atroviridis* and keep at room temperature for overnight. The purity of the treated oil was observed by using FTIR spectrometer. Besides, the clarity index was also observed by measuring the absorption value using UV spectrometer in which the new oil was set as a background.

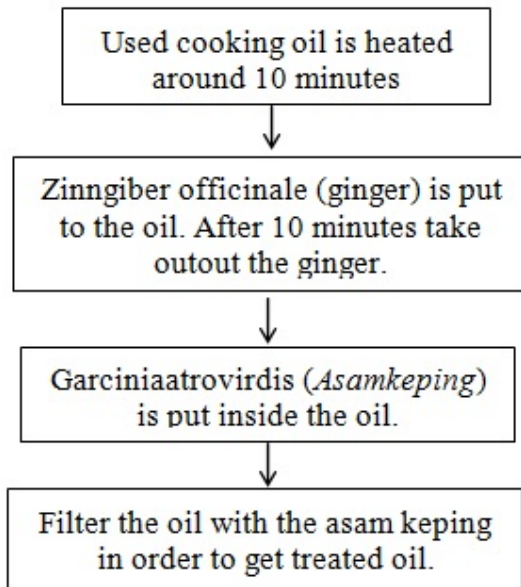


Figure-1. Flow chart process of cooking oil treatment.

RESULTS AND DISCUSSIONS

Figure-2 shows the treated cooking oil after experienced two stages of oil treatment using mixed *Zingiber officinale* and *Garcinia atroviridis*. Though the color of treated cooking oil is not the same as new cooking oil, the treated cooking oil was brighter than used cooking oil. Figure-3 shows the tranmittance curve between the

used cooking oil, new cooking oil and treated cooking oil by using FTIR spectrometer. The graph shows some peak period during the wave numbers at part A in the range between $3640(1/cm^3)$ to $3380(1/cm^3)$ and at part B in range between $2420(1/cm^3)$ to $2240(1/cm^3)$. Figure-4 and Figure-5 show zoomed in from part A and part B. The shape of the graph both of part A and part B shows it have similar trend of graph. From Figure-6, the higher absorbcency indicates that the clarity index of treated oil is better than that of used oil. It means the carbon and other contaminants in used oil was successfully treated.



Figure-2. New, used and treated cooking oils.

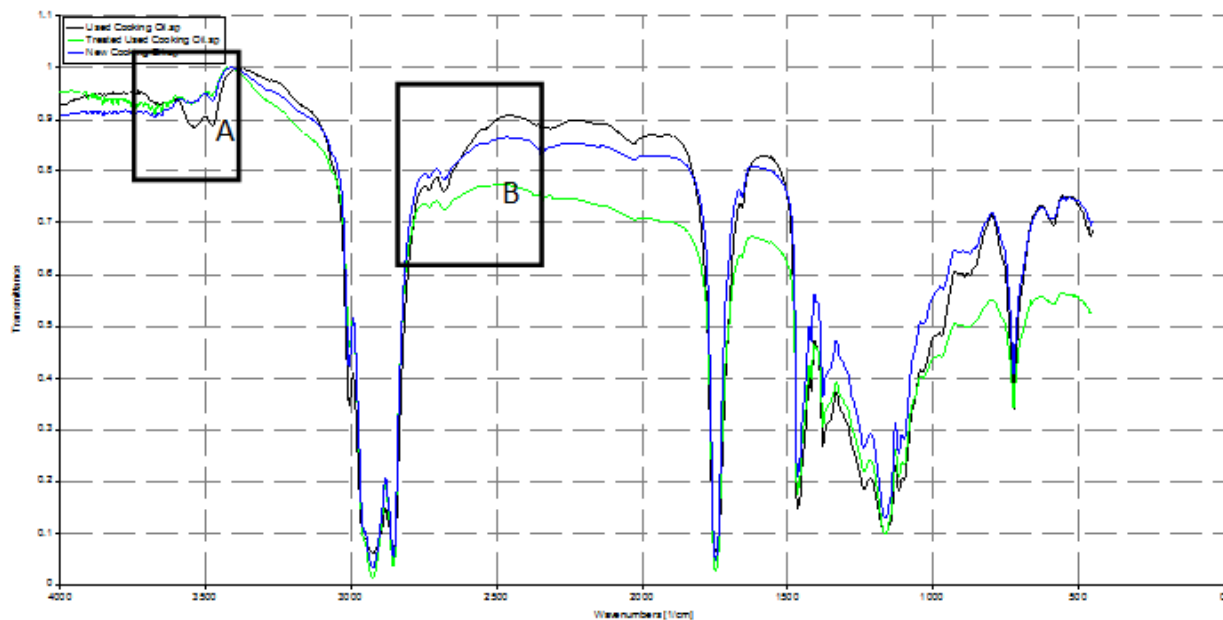


Figure-3. The tranmittance curve between used cooking oil, new cooking oil and treated cooking oil.

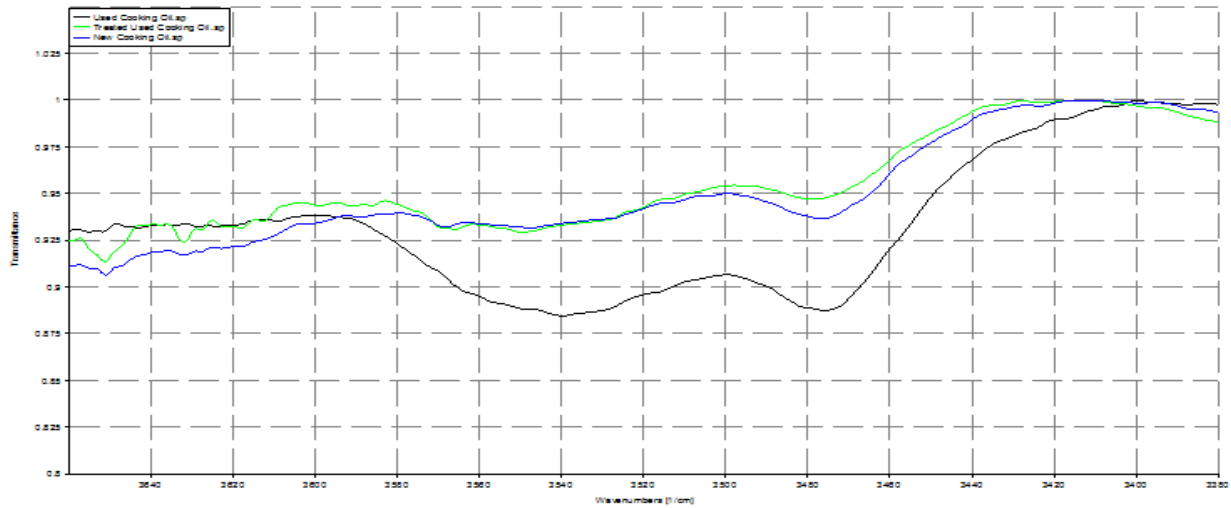


Figure-4. The close up peaks as in A section in Figure-3.

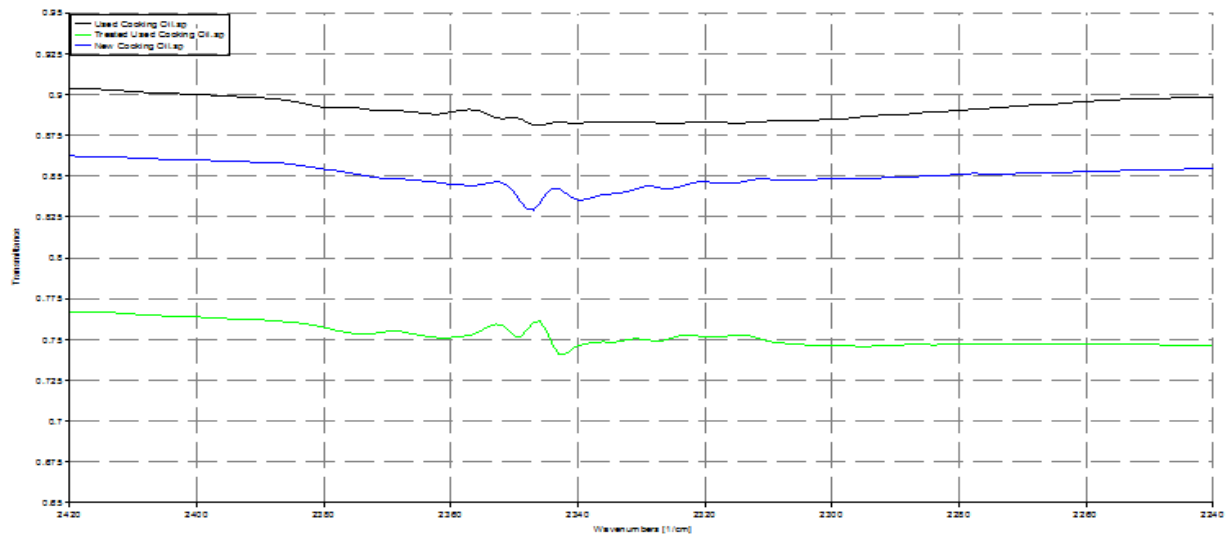


Figure-5. The close up peaks as in B section in Figure-3.

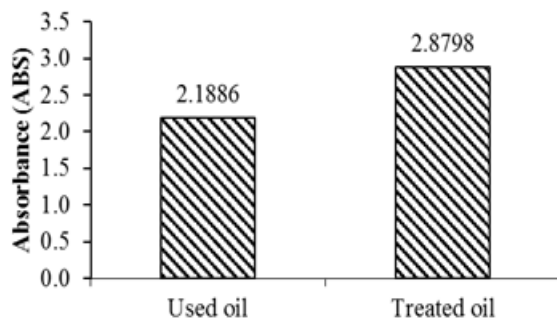


Figure-6. Comparison of clarity index of used oil and threated oil.

CONCLUSIONS

The experimental results showed that the trend of graph treated cooking oil and new cooking oil is similar respectively. In addition, the result by using UV spectrometer shows , treated oil has higher absorbance value than used oil. Besides that, the colour threated cooking oil is become more brighter than used cooking after treated. Finally, it can be stated that used cooking oil after treated by mixed zingiber officinale and garcinia atrovirdis has high potential to lengthening using used cooking oil.

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