

Application of microwave moisture sensor for determination of oil palm fruits ripeness

ABSTRACT

This paper describes the development of a low cost coaxial moisture sensor for the determination of moisture content (30 % to 80 % wet-weight basis) of the oil palm fruits of various degree of fruit ripeness. The sensor operating between 1 GHz and 5 GHz was fabricated from an inexpensive 4.1 mm outer diameter SMA coaxial stub contact panel which is suitable for single fruit measurement. The measurement system consists of the sensor and a PC-controlled vector network analyzer (VNA). The actual moisture content was determined by standard oven drying method and compared with predicted value of fruit moisture content obtained using the studied sensor. The sensor was used to monitor fruit ripeness based on the measurement of the phase or magnitude of reflection coefficient and the dielectric measurement software was developed to control and acquire data from the VNA using Agilent VEE. This software was used to calculate the complex relative permittivity from the measured reflection coefficient between 1GHz and 5 GHz.

Keyword: Vector network analyzer; Moisture content; Reflection coefficient; Oil palm fruits; Microwave sensors; Dielectric constant