

# ELECTRICAL CARBON BRUSHES FROM OIL PALM EMPTY FRUIT BUNCHES

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The annual import of carbon products by Malaysia is approximately RM 24 million (Mohamad *et al.*, 2000). Electrical carbon brush (ECB) is made of carbon and graphite with substantial amounts of metal powder and some additives for lubrication and adhesion. Measured amounts of these materials are ground, blended and mixed according to the grade required before carbonization at high temperature. The ECB function in an electric motor is to transfer current from a fixed external power supply to a rotating part or moving surface of the motor. It is widely used in automotive air conditioners, car window lift motors, washing machines and electrical tools. Depending on the type of motor, the metal content in ECB can vary from 50% to 95% and be copper, lead, silver, iron or manganese (Ichiki, 1978).

## MANUFACTURING PROCESS

Figure 1 illustrates the preparation of green body (before carbonization) for ECB. The first step is to pre-hydrolyze the empty fruit bunch (EFB) to remove the unwanted low molecular components such as extractives and hemicelluloses. This removal reduces the amount of chemicals needed for activation. The activated carbon pre-cursor powder is somewhat sticky, which eliminates the need for adhesive in its blending with electrolytic copper powder, to form the green body. The green body is carbonized at 800°C in nitrogen following a multi-step heating profile. A study showed that with admixture of 60% electrolytic copper powder, ECB from EFB has basic properties comparable to those of commercial ECB (Table 1).

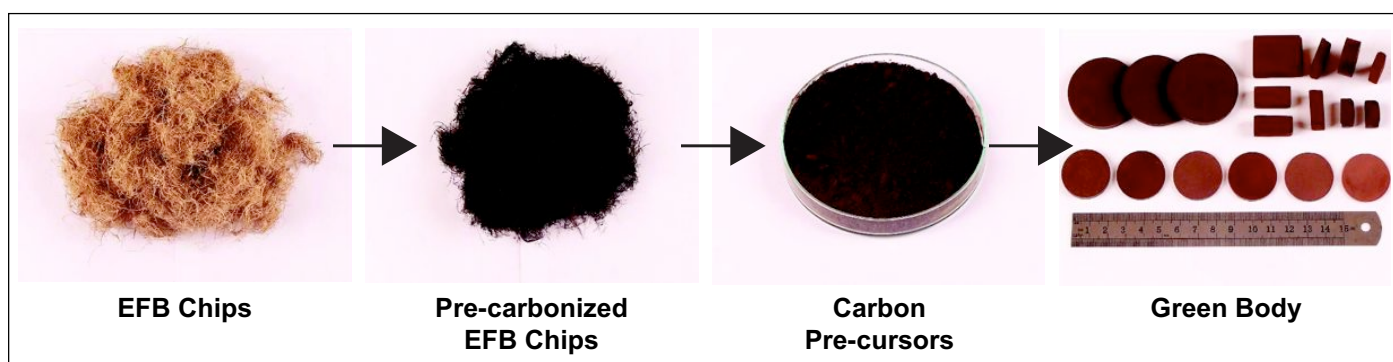



Figure 1. Flow chart of preparation of green body from EFB for ECB.

TABLE 1. CHARACTERISTICS OF ECB FROM EFB AND COMMERCIAL ECB

	EFB carbon brush	Commercial carbon brush
Density	2.61 g cm <sup>-3</sup>	3.20 g cm <sup>-3</sup>
Electrical conductivity	771 (Ωmm) <sup>-1</sup>	142 (Ωmm) <sup>-1</sup>
Rotation per minute	4.05 x 10 <sup>3</sup> rpm	3.72 x 10 <sup>3</sup> rpm



Electrical carbon brush

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