EFFECTS OF FILLER CONTENT AND VARIOUS COUPLING AGENTS ON PROPERTIES OF POLYPROPYLENE/COCOA POD HUSK BIOCOMPOSITES

by

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~Koay Seong Chun~

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LIST OF ABBREVIATIONS

3-APE	3-aminopropyltriethoxylsilane
ASTM	American society for testing and materials
CaCO3	Calcium carbonate
CO_2	Carbon dioxide
COCA	Coconut oil coupling agent
CPH	Cocoa pod husk
DP	Degree of polymerization
DSC	Differential scanning calorimetry
DTG	Derivative thermogravimetry analysis
FTIR	Fourier transform infrared spectroscopy
GCA	Green Coupling Agent
GCA-C	Green coupling agent from virgin coconut oil
GCA-P	Green coupling agent from palm oil
HDPE	High density polyethylene
LDPE	Low density polyethylene
MAA	Methacrylic acid
MAPE	Maleated polyethylene
MAPP	Maleated polypropylene
MPS	3-mercaptopropyltrimethoxysilane
RPM	rotation per minute
NaOH	Sodium hydroxide
OPEFB	Oil palm empty fruit bunch
PBS	Polybutylene succinate
PE	Polyethylene
PLA	Polylactic acid
PP	Polypropylene

PS	Polystyrene
PVC	Polyvinylchloride
SDS	Sodium dodecyl sulfate
SEBS	Styrene ethylene butylene styrene
SEM	Scanning electron microscopy
TGA	Thermogravimetry analysis
UV	Ultra violet
VTS	Vinylethoxysilane
WPC	Wood plastic composites
MFI	Melt flow index

LIST OF SYMBOLS

γ	Surface energy
σ	Stress
η	viscosity
λ	Relative elongation
τ	Shear stress
$\dot{\gamma}$	Shear rate
ΔH_m	Enthalpy of melting
γ_{LV}	Specific surface energy of liquid/vapour
γ_{SL}	Specific surface energy of liquid/solid
γ_{SV}	Specific surface energy of solid/vapour
µm	Micrometer
A	Area of sample
B	Parameter expresses the load bearing capacity of filler that corresponding to the effect of interfacial adhesion
C	Constant depended on mixer geometry
D	Diffusion coefficient
E_a	Activation energy
E_c	Elastic modulus of composites
E_f	Elastic modulus of filler
E_m	Elastic modulus of matrix
F	Force
g	Gram
GPa	Giga Pascal
H or h	Distance between shearing surface
kN	Kilo Newton
L	Length at the failure point
L_0	Original length

M	Measured torque
min	Minute
mm	Millimeter
MPa	Mega Pascal
M_s	moisture content at saturated point
M_t	moisture content at specific time
n	Power law index
n	Strain hardening exponent of polymer matrix
Θ	Contact angle
^oC	Degree Celsius
R_e	radius of outer cylinder
R_i	radius of inner cylinder
R_m	average radius of cylinder
t	Time
T_c	Temperature of crystallization
$T_{d5\%}$	Degradation temperature at 5% of weight loss
$T_{d50\%}$	Degradation temperature at 50% of weight loss
T_{dmax}	Degradation temperature at maximum rate
T_g	Glass transition temperature
T_m	Melting temperature
V	Velocity
V_f	Volume of filler
V_m	Volume of matrix
W_d	Original dried weight of sample
$W_{f\,pp}$	Weight fraction of polypropylene matrix
W_n	Weight of sample after exposure
W_t	Water absorption at time
wt%	Weight percentage
X or x	Amount of shear displacement