

NANO CHARCOAL ASH: ENVIRONMENTALLY PAVEMENT

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1 PROBLEM STATEMENT

- Increment of agricultural waste (for e.g.. Coconut shell)
- Recycle of agricultural waste as modifiers in construction materials
- No research on coconut shell nanomaterial bitumen modification
- Investigate the properties of bitumen with nanomaterial from coconut shell

2 OBJECTIVE

The aim of this study is to evaluate the influences of nano charcoal ash (NCA) from a coconut shell in bitumen and in the asphalt mixture.

3 NOVELTY

- Improve properties of pavement materials.
- Increases service life of pavement
- Reduces the maintenance costs.
- Preserve the environment and reduce waste. (SDG 11: Sustainable Cities & Communities)
- Reduces the risk of hazardous nanomaterials.

4 METHODOLOGY



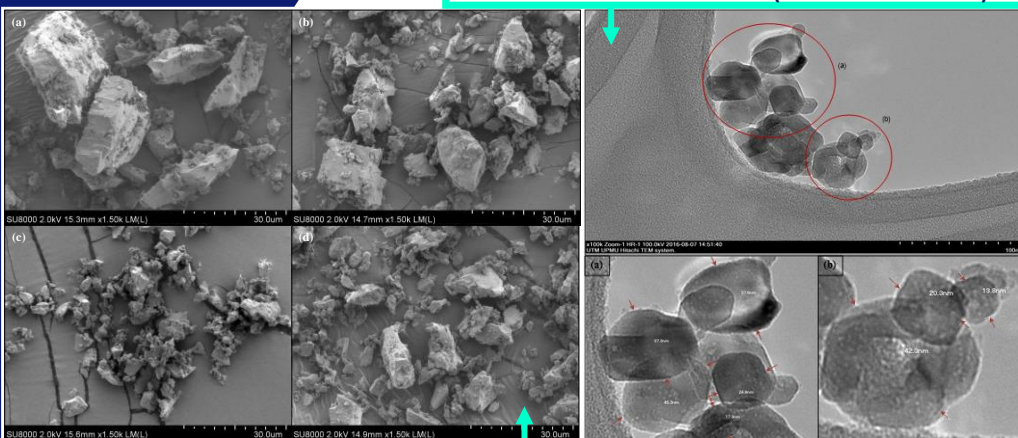
Determine size of nano particles

6 COST ESTIMATION

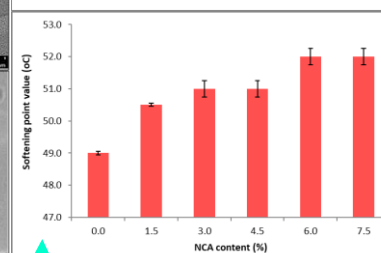
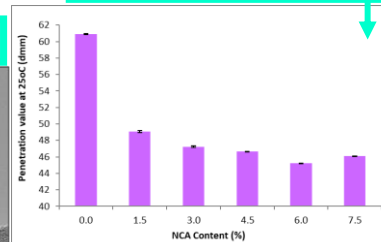
COST ESTIMATION	
Cost of Coconut Shell	RM0.28/kg
Cost to turn into NCA	RM0.53/kg
Energy Consumption	22.7kwh/day
Cost of Bitumen	RM0.72/kg
Bitumen Required (20:80)	4260kg/km
Road with 100% Bitumen	RM3068.65/km
Road with 60% Coconut Mix	RM2570.87/km
Total Cost Saved using Mix	RM497.78

5 RESULTS

Nano Charcoal Ash (100 nm scale)



Penetration Value



Particles distribution of ground charcoal

Softening Point Value

7 PUBLICATIONS

Construction and Building Materials
Volume 173, 10 June 2018, Pages 40-48
ELSEVIER
Mechanical performance of asphalt mixture containing nano-charcoal coconut shell ash
Siti Nur Amiera Jeffry^a, Ramadhansyah Putra Jaya^{a,*, R. R. Norhidayah Abdul Hassan^a, Haryati Yaacob^a, Mohd Khairul Idham Mohd Satar^a}

Construction and Building Materials
Volume 158, 15 January 2018, Pages 1-10
ELSEVIER
Effects of nanocharcoal coconut-shell ash on the physical and rheological properties of bitumen
Siti Nur Amiera Jeffry^a, Ramadhansyah Putra Jaya^{a,*, R. R. Norhidayah Abdul Hassan^a, Haryati Yaacob^a, Jahangir Mirza^{b, c}, Siti Haqqiyati Drahman^b}



8 IN COLLABORATION WITH

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