# Theoretical Insight into the New Astrochemistry Hypothesis of Mixed Aromatic Aliphatic Organic Nanoparticles (MAON) 

SeyedAbdolreza Sadjadi<br>November 14, 2015<br>Space Astronomy Laboratory<br>The University of Hong Kong<br>ssadiadi@hku.hk<br>http://www.scifac.hku.hk/kwok/sal/abdi.html

## Scientific Background

Observations and proposed models







Annual meeting of the Hong Kong Astrophysical Society

## MAON



Kwok and Zhang, Nature, 479:80 (2011)
Sadjadi, Zhang and Kwok, ApJ, 807:95 (2015 July 1)

## MAONs Infrared Fingerprint

Simulated IR spectra for $\mathrm{C}_{155} \mathrm{H}_{240}$, DFT/Drude, $\mathrm{T}=500 \mathrm{~K}$


Sadjadi, Zhang and Kwok, ApJ, 807:95 (2015 July 1)

## MAONs Infrared Fingerprint

Simulated IR spectra for 40 MAONs, DFT/Drude, $T=500 \mathrm{~K}$


Sadjadi, Zhang and Kwok, ApJ, 807:95 (2015 July 1)

## PAHs Infrared Fingerprint



Sadjadi, Zhang and Kwok, ApJ, 807:95 (2015 July 1)

## MAONs Vibrational Motions



## MAONs Vibrational Motions



## MAONs Vibrational Motions



## MAONs Vibrational Motions

Vibrational motion at $11.16 \mu \mathrm{~m}$


## MAONs Vibrational Motions



## MAONs Vibrational Motions

Vibrational motion at $19.06 \mu \mathrm{~m}$ ( $32 \%$ aromatic, $78 \%$ Aliphatic)


## Flow Chart

The backbone of our theoretical approach


Sadjadi, Zhang and Kwok, ApJ, 801:34 (2015 March 1)

## Conclusions

- MAON model is introduced as the individual benzene rings, connected by aliphatic hydrocarbon chains.
- MAON is very simple in bonding, but it is complex in its structure.
- MAON shows discrete and consistent IR bands at different molecular sizes.


## Acknowledgments

- I am grateful to my supervisor: Professor Sun Kwok


## and my two Colleagues:



Dr. Chih-hao Hsia

