Excitation of the aromatic infrared emission bands: Chemical energy in hydrogenated amorphous carbon particles?

Walter W. Duley, David A. Williams

(Submitted on 19 Jul 2011)

We outline a model for the heating of hydrogenated amorphous (HAC) dust via the release of stored chemical energy and show that this energy (~12 kJ/mole) is sufficient to heat dust grains of classical size (50-1000 {\AA}) to temperatures at which they can emit at 3.3 {\mu}m and other "UIR" wavelengths. Using laboratory data, we show that this heating process is consistent with a concentration of a few percent of dangling bonds in HAC and may be initiated by the recombination of trapped H atoms. We suggest that the release of chemical energy from dust represents an additional source of excitation for the UIR bands relaxing the previous requirement that only stochastically heated molecules having fewer than ~ 50 atoms can produce emission at 3.3 {\mu}m.

Comments: 14 pages, 1 figure, Accepted by ApJ Letters
Subjects: **Galaxy Astrophysics (astro-ph.GA)**
Cite as: **arXiv:1107.3778 [astro-ph.GA]**
(or **arXiv:1107.3778v1 [astro-ph.GA]** for this version)

Submission history

From: Walter Duley [view email]
[v1] Tue, 19 Jul 2011 17:13:12 GMT (332kb)

Which authors of this paper are endorsers?