DAMANVEER S. GREWAL

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Education

2016-Present Ph.D. (Planetary Science), Rice University, Houston, USA. GPA = 4.06/4.00
Thesis Title: *Origin of nitrogen and carbon in protoplanetary and planetary bodies of the inner Solar System*
Supervisor: Dr. Rajdeep Dasgupta

2007-2012 Integrated M.Sc. (Applied Geology), Indian Institute of Technology (IIT) Kharagpur, India
Thesis Title: *First Report of an Upper Triassic Saurischian Dinosaur from the Rewa-Gondwana Basin, India*
Supervisor: Dr. Sanghamitra Ray

Professional Appointments

2016-Present Research Assistant, Rice University, Houston, USA
2014-2015 Chemistry Teacher, Lakshya Institute, India
2012-2014 Chemistry Teacher, iQuest Eduventures, India
2010 Research Intern, Christian-Albrechts-Universität zu Kiel, Germany

Awards and Scholarships

2019-2021 NASA Earth and Space Science Fellowship ($90,000)
2019 Lodieska Stockbridge Vaughn Fellowship ($16,750)
2019 Torkild Rieber Award in Geology ($2000)
2019 Goldschmidt Travel Grant ($1000)
2018 Goldschmidt Travel Grant ($1800)
2015 Award for teaching excellence, Lakshya Institute
2014 Best teacher, iQuest Eduventures
2007-2012 Innovation in Science Pursuit for Inspired Research (INSPIRE), Department of Science and Technology, India

Peer-reviewed articles

Published/ In Press
([#] designates supervised interns)

7. **Grewal, D.S.**, Dasgupta, R., Marty, B. (2021) An extremely early origin of nitrogen in inner Solar System protoplanets. *Nature Astronomy* (in press)

6. **Grewal, D.S.**, Dasgupta, R., Farnell, A.[#] (2020) The speciation of carbon, nitrogen, and water in magma oceans and its effect on volatile partitioning between major reservoirs of the Solar System rocky bodies. *Geochimica et Cosmochimica Acta* **280**: 281-301. doi: 10.1016/j.gca.2020.04.023
5. Dasgupta, R., **Grewal, D.S.** (2019). Origin and Early Differentiation of Carbon and Associated Life-Essential Volatile Elements on Earth. In Orcutt, B., Daniel, I., Dasgupta, R. (Eds.) *Deep Carbon: Past to Present (Cambridge University Press)*. 4-39. doi: 10.1017/9781108677950.002
4. Hakim, K., Spaargaren, R., **Grewal D.S.**, Rohrbach A., Brendt J., Dominik, C., van Westrenen, W. (2019) A laboratory approach to probe the mineralogy of carbon-rich rocky exoplanets. *Astrobiology* **9**: Number 7. doi: 10.1089/ast.2018.1930
3. **Grewal, D.S.**, Dasgupta, R., Holmes, A.K., Costin, G, Li Y., Tsuno K. (2019) The fate of nitrogen during core-mantle separation on Earth. *Geochimica et Cosmochimica Acta* **251**: 87-115. doi: 10.1016/j.gca.2019.02.009
2. **Grewal, D.S.**, Dasgupta, R., Sun, C., Tsuno K., Costin, G. (2019) Delivery of Carbon, Nitrogen and Sulfur to the Silicate Earth. *Science Advances* **5**: eaau3669. doi: 10.1126/sciadv.aau3669
   *One of the highest altimetric score (**1428**; top 0.01% of all research papers ever tracked) of research published in planetary science with press release being covered by more than 200 news outlets across the globe including CNN, BBC News, Fox News, The Guardian, Daily Mail, Forbes, Sky News, Yahoo News, USA Today, Science Daily, Gizmodo and China Daily*
1. Tsuno, K., **Grewal, D.S.**, Dasgupta, R. (2018). Core-mantle fractionation of carbon in Earth and Mars: The effects of sulfur. *Geochimica et Cosmochimica Acta* **238**: 477-495. doi: 10.1016/j.gca.2018.07.010

Under review/ In revision
([#] designates supervised interns)

8. **Grewal, D.S.**, Dasgupta, R, Hough T.[#], Farnell, A.[#] (202x) Nitrogen depletion in rocky bodies of the inner Solar System linked to the rates of protoplanetary accretion and differentiation. *Nature Geoscience*
9. **Grewal, D.S.**, Dasgupta, R., Aithala, S.[#] (202x) The effect of carbon concentration on its core-mantle partitioning behavior in inner Solar System rocky bodies. *Earth and Planetary Science Letters*
10. **Grewal, D.S.**, Dasgupta, R. (202x) Magma oceans in the earliest formed protoplanets – Internal or External? *Earth and Planetary Science Letters*

In Preparation
([#] designates supervised interns)

11. **Grewal, D.S.**, Sun, T., Aithala, S.[#], Hough T.[#], Dasgupta, R., Yeung, L. Nitrogen isotope fractionation during core-mantle differentiation.
12. **Grewal, D.S.**, Seales, J., Dasgupta, R. Contribution of late accretion to the carbon and nitrogen budget of the bulk silicate Earth.

13. **Grewal, D.S.**, Dasgupta, R. The fate of volatiles during differentiation in rocky bodies across the Solar System

Presentations at Scientific Meetings and Conferences
(* designates presenting author, # designates supervised interns)

Grewal, D.S.*, Dasgupta, R., Aithala, S.# The effect of bulk carbon on its core-mantle partitioning behavior. *American Geophysical Union Fall Meeting* (December 2020) [ORAL]

Dasgupta, R., **Grewal, D.S.*** Magma ocean differentiation regime in the earliest formed rocky bodies inferred from volatile abundances in iron meteorites. *American Geophysical Union Fall Meeting* (December 2020) [ORAL]

Grewal, D.S.*, Dasgupta, R. The Effect of Differentiation via Internal Versus External Magma Oceans on the Carbon and Nitrogen Budgets of Rocky Planets. *Goldschmidt Conference* (June 2020) [ORAL]

Grewal, D.S. * Origin of major volatiles in rocky bodies of the inner Solar System. *University of California, Riverside (Biogeochemistry group)* (April 2020) [INVITED]

Grewal, D.S.*, Hough T.#, Dasgupta, R., Aithala, S.# Protoplanetary Differentiation is the Primary Cause of Nitrogen Depletion in Bulk Silicate Reservoirs of Rocky Bodies. *Lunar and Planetary Science Conference* (March 2020) [ORAL] – *cancelled*

Grewal, D.S.*, Dasgupta, R., Hough T.# The core-mantle partitioning of carbon and nitrogen in carbon-undersaturated ultramafic systems. *American Geophysical Union Fall Meeting* (December 2019) [POSTER]

Grewal, D.S.*, Hough T.#, Dasgupta, R. The core-mantle partitioning of nitrogen in carbon-undersaturated ultramafic Systems. *Goldschmidt Conference* (August 2019) [ORAL]

Dasgupta, R.*, **Grewal, D.S.**, Tsuno K. Control of Accretion and Early Differentiation Process on the Diversity of Volatile Inventory of Rocky Solar System Objects. *Goldschmidt Conference* (August 2019) [ORAL]

Dasgupta, R.*, **Grewal, D.S.**, Tsuno K. Origin of Life-essential Volatile Elements in Rocky Planets – Insights from Accretion and Early Differentiation of Inner Solar System Objects. *Astrobiology Science Conference* (June 2019) [ORAL]

Grewal, D.S.*, Dasgupta, R., Holmes, A.K., Costin, G, Li Y., Tsuno K. The fate of nitrogen during core-mantle separation. *Lunar and Planetary Science Conference* (March 2019) [ORAL]

Grewal, D.S.*, Dasgupta, R., Farnell, A.#, Hough T.#, Costin, G, Tsuno K, Li Y., Holmes, A.K. The compositions of the early atmospheres formed by magma ocean degassing. *Lunar and Planetary Science Conference* (March 2019) [POSTER]

Dasgupta, R., **Grewal, D.S.*,** Sun, C., Tsuno, K., Costin, G. The Origin of Earth's Major Volatiles via Accretion of a Large Planetary Embryo. *Lunar and Planetary Science Conference* (March 2019) [POSTER]

Grewal, D.S.*, Dasgupta, R., Farnell, A.[#], Hough T.[#], Costin, G, Tsuno K, Li Y., Holmes, A.K. Evolution of the C/N ratio of the Bulk Silicate Earth as a probe to understand the roles of volatile accretion and differentiation. *American Geophysical Union Fall Meeting* (December 2018) [POSTER]

Dasgupta, R.*, **Grewal, D.S.** Origin and Early Differentiation of Carbon and Associated Life-Essential Volatile Elements on Earth. *American Geophysical Union Fall Meeting* (December 2018) [POSTER]

Grewal, D.S.*, Dasgupta, R., Holmes, A.K., Costin, G, Li Y., Tsuno K. The fate of nitrogen during core-mantle separation on Earth. *Goldschmidt Conference* (August 2018) [ORAL]

Grewal, D.S.*, Dasgupta, R., Costin, G, Tsuno K, Li Y., Holmes, A.K. Evolution of the C/N ratio of the Bulk Silicate Earth as a probe to understand the roles of volatile accretion and differentiation. *Gordon Research Conference* (June 2018) [POSTER]

Grewal, D.S.*, Dasgupta, R., Sun, C., Tsuno K., Costin, G. Delivery of Carbon, Nitrogen and Sulfur to the Silicate Earth. *Carbon in the Solar System Workshop* (April 2018) [ORAL]

Grewal, D.S.*, Dasgupta, R. The origin of volatiles on Earth. *Pre-IRESS Workshop, Rice University* (February 2018) [ORAL]

Grewal, D.S.*, Dasgupta, R., Sun, C., Tsuno, K. Simultaneous alloy-silicate fractionation of carbon, nitrogen, and sulfur at high pressures and temperatures: Implications for establishing the volatile budget of the Earth. *American Geophysical Union Fall Meeting* (December 2017) [ORAL]

Tsuno, K.*, Dasgupta, R., **Grewal, D.S.** The effects of sulfur on carbon partitioning and solubility in high pressure-temperature alloy-silicate systems: Implications for fractionation of carbon and sulfur during accretion and core formation of Earth and Mars. *American Geophysical Union Fall Meeting* (December 2017) [ORAL]

Grewal, D.S.*, Dasgupta, R., Sun, C., Tsuno, K., Costin, G. Delivery of Carbon, Nitrogen and Sulfur to the Silicate Earth by a Giant Impact. *Deep Carbon Observatory Extreme Physics and Chemistry Workshop, Arizona State University* (November 2017) [ORAL]

Tsuno, K.*, Dasgupta, R., **Grewal, D.S.** The effects of sulfur on carbon partitioning and solubility in high pressure-temperature alloy-silicate systems. *Deep Carbon Observatory Extreme Physics and Chemistry Workshop, Arizona State University* (November 2017) [POSTER]

Grewal, D.S.*, Dasgupta, R., Sun, C., Tsuno, K., Costin, G. Delivery of Carbon, Nitrogen and Sulfur to the Silicate Earth by a Giant Impact. *Graduate Interdisciplinary Earth Science Symposia, Rice University* (November 2017) [ORAL]

Grewal, D.S.*, Dasgupta, R., Tsuno, K. Simultaneous alloy-silicate fractionation of carbon, nitrogen, and sulfur at high pressures and temperatures: Implications for establishing the volatile budget of the Earth. *Gordon Research Conference* (June 2017). [POSTER]

Tsuno, K.*, Dasgupta, R., **Grewal, D.S.** The effects of sulfur on carbon partitioning and solubility in high pressure-temperature alloy-silicate systems. *Gordon Research Conference* (June 2017). [POSTER]

Science Articles

Grewal, D.S., Furtney, M. When planets collide: Origin of life on Earth. *The Science Breaker* (under review)

Grewal, D.S., Lv, M., Dorfman, S. Press Release - *Extreme Physics and Chemistry Community Workshop, Arizona State University, USA. Deep Carbon Observatory* (November 2017)

Synergistic Activities (Academic)

Reviewer for *Science Advances, Nature Communications, Earth and Planetary Science Letters, Geochimica et Cosmochimica Acta, Journal of Geophysical Research: Planets, Geochemical Perspectives Letters*

Practical and Analytical Proficiency

Performing high P-T experiments using piston-cylinder and multi-anvil apparatus, Electron Probe Micro Analyzer (EPMA), Fourier Transform Infrared Spectroscopy (FTIR), Raman Spectroscopy, programming in MATLAB, and Secondary Ion Mass Spectrometry (in collaboration with others)

Research Supervision

2020	Principal research supervisor of Melinda Zhou (high school student from Mayde Creek High School, Katy)
2019-2020	Principal research supervisor of Sanath Aithala (undergrad from University of Houston)
2019	Principal research supervisor of Alexandra Farnell (high school student from St. John's School, Houston)
2019	Principal research supervisor of Ryan Anselm (high school student from Clemens High School, Sugarland)
2019	Principal research supervisor of Melinda Zhou (high school student from Mayde Creek High School, Katy)
2018-2019	Principal research supervisor of Taylor Hough (undergrad from Brown

	University)
2018	Principal research supervisor of Alexandra Farnell (high school student from St. John's School, Houston)
2017	Principal research supervisor of Rohil P. Bathija (high school student from Awty International School, Houston)
2016-2018	Co-supervisor of Alexandra K. Holmes' undergrad thesis (Rice University) Principal supervisor - Dr. Rajdeep Dasgupta

Teaching Experience

2019	Lecturer for ESCI 114 – Discoveries in Earth, Environmental and Planetary Sciences
2018	Substitute Lecturer for ESCI 412/612 – Advanced Petrology (1 lecture)
2012-2015	Lectures on undergraduate level Physical, Organic and Inorganic Chemistry to more than 800 students for engineering, medical and science university entrance examinations
2012-2015	Lectures on Physical, Organic and Inorganic Chemistry for International and National Chemistry Olympiads

Geological Field Experience

2017	Study of volcanic eruption deposits and collecting xenoliths, South California
2015	Study of volcanic deposits in the Cascades, USA
2011	Structural mapping of a complex metamorphic terrain in the Eastern Ghats Province, Angul (Eastern India)
2010	Reconstruction of Paleocurrent direction and Paleostratigraphy in the Rewa Basin, Madhya Pradesh (Eastern India)
2010	Strike mapping and ore volume estimation in an underground Uranium mine, Jaduguda (Eastern India)
2009	Mapping in a sedimentary-metamorphic terrain of the Singhbhum Shear Zone Jharkhand (Eastern India)
2008	Structural mapping and identification of deformation structures in a Precambrian orogenic belt, Ghatshila (Eastern India)

Memberships with Professional Societies

Geochemical Society
American Geophysical Union