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目前任职:

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教育经历:

1998年: 日本东京大学大学院地质学专攻 理学博士

1993年: 日本琉球大学海洋科学系 理学硕士

1988年: 中国地质科学院研究生部 理学硕士

1985年: 中国北京大学地质学系 理学学士

研究工作经历:

2014年至今: 北京大学工学院能源与资源系 讲席教授

2005年-2013年: 加拿大国家研究院Steacie分子科学研究所 研究员

2002年-2005年: 加拿大地质调查局 NSERC Visiting Fellow

1998年-2002年: 日本石油公团 技术研究中心 研究员

1988年-1991年: 中国地质科学院矿床研究所 助理研究员

主要研究内容:

1. 天然气水合物野外调查和产出特征研究

通过野外调查实际观察天然气水合物的产出特征, 并采取天然气水合物、孔隙水、沉积物等样品, 以在实验室进一步深入研究。

2. 用模拟实验研究天然气水合物的成藏机理和开发利用方法

用自主研发的各种专门用于天然气水合物模拟实验的压力容器, 模拟天然气水合物形成的各种条件, 研究影响天然气水合物形成的各种因素, 求解天然气水合物的形成和分解机理, 为天然气水合物的勘查、储层评价和生产技术研发提供依据。

3. 气体水合物基础物理、化学性质研究

通过实验方法, 研究气体水合物的基础物理 (声波速度、电阻率、热传导、等) 和化学 (热力学稳定性、形成及分解动力学、等) 性质, 为天然气水合物的勘查和生产技术研发提供基础参数。

4. 天然气水合物开发技术方法研究

根据天然气水合物物理、化学性质及其产出特征, 研究天然气水合物的开发利用方法。

5. 致密油气藏表征和油气分子在储层孔隙中物理、化学性质研究

和其他研究人员合作, 主要从事致密油气藏储层岩石孔隙的表征方法、有机物组分分析及有机孔表征、以及油气分子在储层岩石孔隙中的物理、化学性质有关的研究。

发表论文:

1. 期刊论文 (部分) :

C. Tulk, S. Machida, D.D. Klug, H. Lu, M. Guthrie, J.J. Molaison, 2014. The structure of CO₂ hydrate between 0.7 and 1.0 GPa. Journal of Chemical Physics, 141, 174503 (DOI: 10.1063/1.4899265).

Z. Cai, H. Lu, R. Zou, S. Han, Z. Wang, 2014. Structural and thermodynamic characteristics of sH₂,2-dimethylbutane-methane deuterohydrate, J. Chemical Thermodynamics, 77, 82-86.

H. Lu, J. Wang, C. Liu, C. Ratcliffe, U. Becker, R. Kumar, and J. Ripmeester, 2012. Multiple H₂ occupancy of cages of clathrate hydrate under mild condition. Journal of the American Chemical Society, 134, 9160-9162 (DOI: 10.1021/ja303222u).

C. Liu, Y. Ye, Q. Meng, X. He, H. Lu, J. Zhang, J. Liu, and S. Yang, 2012. The characteristics of gas hydrates recovered from Shenhu Area in the South China Sea. *Marine Geology*, 307-310, 22-27, DOI: 10.1016/j.margeo.2012.03.004.

H. Lu, T. Kawasaki, T. Ukita, I.L. Moudrakovski, T. Fujii, S. Noguchi, T. Shimada, M. Nakamizu, J. Ripmeester, C. Ratcliffe, 2011. Particle-size effect on the saturation of methane hydrate in sediments – Constrained from experimental results. *Marine and Petroleum Geology*, 28, 1801-1805 (DOI: 10.1016/j.marpetgeo.2010.11.007).

J.-W. Lee, H. Lu, I.L. Moudrakovski, C.I. Ratcliffe, R. Ohmura, S. Alavi, J.A. Ripmeester, 2011. ¹³C NMR Studies of Hydrocarbon Guests in Synthetic Structure H Gas Hydrates: Experiment and Computation. *Journal of Physical Chemistry A*, 115, 1650-1657 (DOI: 10.1021/jp118184).

H. Lu, T. Lorenson, I. Moudrakovski, J. Ripmeester, T. Collett, R. Hunter, and C. Ratcliffe, 2011. The characteristics of gas hydrates recovered from BPXA-DOE-USGS Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope. *Marine and Petroleum Geology*, 28, 411-418 (DOI: 10.1016/j.marpetgeo.2010.01.002).

T. Kneafsey, H. Lu, W. Winters, R. Boswell, R. Hunter, and T. Collett, 2011. Examination of core samples from the Mount Elbert Gas Hydrate Stratigraphic Test Well, Alaska North Slope: Effects of retrieval and preservation. *Marine and Petroleum Geology*, 28, 381-393 (DOI: 10.1016/j.marpetgeo.2009.10.009).

J. Wang, H. Lu, J.A. Ripmeester, and U. Becker, 2010. Molecular-dynamics and first-principles calculations of Raman spectra and molecular and electronic structure of hydrogen clusters in hydrogen clathrate hydrate. *Journal of Physical Chemistry C*, 114, 21042-21050 (DOI:10.1021/jp106788u).

J.-W. Lee, H. Lu, I.L. Moudrakovski, C.I. Ratcliffe, J.A. Ripmeester, 2010. Thermodynamic and molecular-scale analysis of new systems of water soluble hydrate formers + CH₄. *Journal of Physical Chemistry B*, 114, 13393-13398 (DOI:10.1021/jp106466s).

J.M. Shicks, M.A. Ziemann, H. Lu, and J.A. Ripmeester, 2010. Raman spectroscopic investigations on natural samples from the Integrated Ocean Drilling Program (IODP) Expedition 311: indications for heterogeneous compositions in hydrate crystals. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 77, 973-977 (DOI:10.1016/j.saa.2010.08.033).

T. Kawasaki, H. Lu, T. Fujii, and J.A. Ripmeester, (2009). Investigations of Particle Size and Clay Mineral Effect on Gas Hydrate Formation in Natural Sediment. *Journal of Geography*, 118, 872-882 (in Japanese with English Abstract).

J. Wang, H. Lu, and J. Ripmeester, 2009. Raman spectroscopy and cage occupancy of hydrogen clathrate hydrate from first-principle calculations. *Journal of the American Chemical Society*, 131, 14132-14133 (DOI: 10.1021/ja904140y).

C. Liu, H. Lu, and Y. Ye, 2009. Raman spectroscopy of Nitrogen clathrate hydrate. *Chinese Journal of Chemical Physics*, 22, 353-358.

R. Matsumoto, Y. Okuda, A. Hiruta, H. Tomaru, E. Takeuchi, R. Sanno, M. Suzuki, K. Tsuchinaga, Y. Ishida, O. Ishizaki, R. Takeuchi, J. Komatsubara, A.F. Freire, H. Machiyama, C. Aoyama, M. Joshima, M. Hiromatsu, G. Snyder, H. Numanami, M. Satoh, Y. Matoba, H. Nakagawa, Y. Kakuwa, S. Ogihara, K. Yanagawa, M. Sunamura, T. Goto, H. Lu, and T. Kobayashi, 2009. Formation and collapse of gas hydrate deposits in high methane flux area of the Joetsu Basin, Eastern Margin of Japan Sea. *Journal of Geography*, 118, 43-71.

C. Liu, Y. Ye, H. Lu, and J.A. Ripmeester, 2008. Formation and Raman spectroscopic characteristics of nitrogen, oxygen and air hydrates. *Geoscience*, 22, 1-5.

C. Liu, H. Lu, Y. Ye, J.A. Ripmeester, X. Zhang, 2008. Raman spectroscopic observations on the structural characteristics and dissociation behavior of methane hydrate synthesized in silica sands with various sizes. *Energy & Fuels*, 22, 3986-3988 (DOI: 10.1021/ef800440s).

H. Zeng, H. Lu, E. Huva, V.K. Walker, and J.A. Ripmeester, 2008. Differences in nucleator adsorption may explain distinct inhibition activities of two gas hydrate kinetic inhibitors. *Chemical Engineering Science*, 63, 4026-4029 (doi:10.1016/j.ces.2008.05.001).

H. Lu, Y. Tsuji, and J.A. Ripmeester, 2007. Stabilization of methane hydrate by pressurization with He or N₂ gas. *Journal of Physical Chemistry B*, 111, 14163-14168 (DOI: 10.1021/jp076858t).

K. Udachin, H. Lu, G. Enright, C. Ratcliffe, R. Chapman, M. Riedel, and G. Spence, J.A. Ripmeester, 2007. Single-crystals of naturally occurring gas hydrates: the structures of methane and methane-mixed hydrocarbon hydrates. *Angewandte Chemie International Edition*, 46, 8220-8222 (DOI: 10.1002/anie.200701821).

H. Lu, Y. Seo, J. Lee, I. Moudrakovski, J.A. Ripmeester, R. Chapman, R. Coffin, G. Gardner, and J. Pohlman, 2007. Complex gas hydrates from the Cascadia Margin. *Nature*, 445, 303-306 (DOI: 10.1038/nature05463).

J. Lee, H. Lu, I.L. Moudrakovski, C.I. Ratcliffe, and J.A. Ripmeester, 2006. n-Pentane and n-Hexane as Coguests in Structure-H Hydrates in Mixtures of 2,2-Dimethylbutane and Methane. *Angewandte Chemie International Edition*, 45, 2456 - 2459 (doi:10.1002/anie.200504366).

H. Lu, I. Moudrakovski, M. Riedel, G. Spence, J.A. Ripmeester, F. Wright, and S. Dallimore, 2005. The occurrence and structural characteristics of the gas hydrates associated with a cold vent field, Offshore Vancouver Island. *Journal of Geophysical Research-solid earth*, 110, B10, B10204, doi:10.1029/2005JB003900.

H. Lu, and R. Matsumoto, 2005. Experimental studies on the possible influences of composition changes of pore water on the stability conditions of methane hydrate in marine sediments. *Marine Chemistry*, 193, 149-157.

H. Lu, R. Dutrisac, J. Ripmeester, F. Wright, and T. Uchida, 2005. Measurements of gas hydrate saturation in sediment cores recovered from the JAPEX/JNOC/GSC et al. Mallik 5L-38 gas hydrate production research well. *Geological Survey of Canada Bulletin*, vol. 585, 89.

J.A. Ripmeester, H. Lu, I. Moudrakovski, R. Dutrisac, F. Wright, and S. Dallimore, 2005. Structure and composition of gas hydrate in sediment recovered from the JAPEX/JNOC/GSC et al. Mallik 5L-38 gas hydrate production research well, determined by X-ray diffraction and Raman and solid state nuclear magnetic resonance spectroscopy. *Geological Survey of Canada Bulletin*, 585, 106.

R. Matsumoto, H. Tomaru, Y. Chen, H. Lu, and I.D. Clark, 2005. Geochemistry of the interstitial waters of the JAPEX/JNOC/GSC/ et al. Mallik 5L-38 gas hydrate research well, Mackenzie Delta, Canada. *Geological Survey of Canada Bulletin*, 585, 98.

H. Tomaru, R. Matsumoto, Y. Chen, H. Lu, and I.D. Clark, 2005. Evolution of a gas hydrate system as recorded by oxygen and hydrogen isotopes of the interstitial waters of the JAPEx/JNOC/GSC et al. Mallik 5L-38 gas hydrate production research well. Geological Survey of Canada Bulletin, 585, 99.

T. Uchida, H. Lu, H. Tomaru, 2004. Subsurface occurrence of natural gas hydrate in the Nankai Trough area: implication for gas hydrate concentration. Resource Geology, 54, 35-44.

R. Matsumoto, H. Tomaru, and H. Lu, 2004. Detection and evaluation of gas hydrates in Eastern Nankai Trough by geochemical and geophysical methods. Resource Geology, 54, 53-67.

H. Tomaru, R. Matsumoto, H. Lu, and T. Uchida, 2004. Geochemical process of gas hydrate formation in the Nankai Trough based on chloride and isotopic anomalies in interstitial water. Resource Geology, 54, 45-51.

H. Lu, and R. Matsumoto, 2002. Preliminary experimental results of the stable P-T condition of methane hydrate in a nanofossil-rich claystone column. Geochemical Journal, 36, 21-30.

H. Lu, R. Matsumoto, Y. Tsuji, and H. Oda, 2001. Anion plays a more important role than cation in affecting gas hydrate stability in electrolyte solutions? - a recognition from experimental results. Fluid Phase Equilibria, 178, 225-232.

H. Lu, R. Matsumoto, and Y. Watanabe, 2000. Major element geochemistry of the sediments from Site 997, Blake Ridge, Western Atlantic. In: Paull, C., Matsumoto, R., and Wallace, P., Ocean Drilling Program, Scientific Results, 164, 147-149.

Y. Watanabe, R. Matsumoto, and H. Lu, 2000. Trace element geochemistry of the Blake Ridge sediments at Site 997. In: Paull, C., Matsumoto, R., and Wallace, P., Ocean Drilling Program, Scientific Results, 164, 151-163.

H. Lu, and R. Matsumoto, 1998. Synthesis of CO₂ hydrate in various CH₃CO₂Na/CH₃CO₂H pH buffer solutions. In: Henriot, J.-P. & Mienert, J. (eds) Gas Hydrates: Relevance to World Margin Stability and Climate Change. Geological Society, London, Special Publications: 137, 107-111.

H. Lu, and S. Yamamoto, 1994. Geochemical recognition criteria of pelagic and hemipelagic bedded cherts of the Permian to Jurassic ages from Ie and Izena Islands, Okinawa, Japan. Journal of the Sedimentological Society of Japan, No. 40, 33-46.

S. Yamamoto, and H. Lu, 1994. Minor amount of carbonates contained in the sediments deeper than CCD. Earth Monthly, 16, 389-393 (in Japanese).

C. Wu, H. Lu, L. Xu, and L. Hou, 1993. A preliminary study on modes of Rare Earth Elements in the tropical-subtropical weathering crust of Nanling region. Mineral Deposits, 12, 297-307 (in Chinese with English abstract).

2.会议论文 (部分) :

H. Lu, I. Moudrakovski, J. Ripmeester, C. Ratcliffe, R. Matsumoto, A. Tani, The characteristics of gas hydrates recovered from Joetsu Basin, eastern margin of the Sea of Japan. Proceedings of the 7th International Conference on Gas Hydrates (ICGH 2011), Edinburgh, Scotland, UK, 17-21 July 2011.

T. Ukita, H. Lu, S. Noguchi, I. Moudrakovski, T. Shimada, J. Ripmeester, C. Ratcliffe, Experimental study on the possible factors that affect the saturation of gas hydrate in natural sediments, Proceedings of the 7th international Conference on Gas Hydrate, 17-21 July 2011, Edinburgh, Scotland, UK.

H. Lu, T. Kawasaki, H. Zeng, T. Fujii, M. Nakamizu, J.A. Ripmeester, Sediment control on the saturation level of gas hydrate in natural environment. The Proceedings of 6th International Conference on Gas Hydrates, Vancouver, 06-10 July 2008.

H. Lu, J. Ripmeester, A protocol for the analyses of natural gas hydrates. The Proceedings of 6th International Conference on Gas Hydrates, Vancouver, 06-10 July 2008.

J.M. Schicks, H. Lu, M. Ziemann, J. Ripmeester, Characteristics of gas hydrates formed from H₂S and CH₄ gas under various conditions. The Proceedings of 6th International Conference on Gas Hydrates, Vancouver, 06-10 July 2008.

T. Kawasaki, H. Lu, T. Fujii, M. Nakamizu, J. Ripmeester, Experimental studies of the saturation level of methane hydrate in the eastern Nankai Trough sediments. The Proceedings of 6th International Conference on Gas Hydrates, Vancouver, 06-10 July 2008.

C. Liu, H. Lu, Y. Ye, J. Ripmeester, Raman spectroscopic observations on the structural characteristics and dissociation behavior of methane hydrate synthesized in silica sands with various sizes. The Proceedings of 6th International Conference on Gas Hydrates, Vancouver, 06-10 July 2008.

J. Lee, H. Lu, I. Moudrakovski, C. Ratcliffe, J. Ripmeester, New findings on guest enclathration in structure-H hydrates by means of thermodynamic and spectroscopic analysis. The Proceedings of 6th International Conference on Gas Hydrates, Vancouver, 06-10 July 2008.

H. Lu, J. Ripmeester, and M. Das, Direct determination of gas hydrate stability using recovered natural gas hydrate sample. The Proceedings of 5th International Gas Hydrate Conference, Trondheim, Norway, June 13-16, 2005.

海洋调查及其他野外工作经验:

2014年11月1日-14日: 参加马尔马拉海 (Sea of Marmara) 天然气水合物调查。

2012年10月15日-19日: 参加在加拿大阿尔伯塔省卡尔加里的页岩气野外调查。

2010年6月15-26日: 参加在日本海的天然气水合物的调查研究, 负责天然气水合物及孔隙水的样品采集和分析。

2009年7月23-8月5日: 参加在日本海的天然气水合物的调查研究, 负责天然气水合物及孔隙水的样品采集和分析。

2006年7月30-8月4日: 参加在日本海的天然气水合物的调查研究, 负责天然气水合物及孔隙水的样品采集和分析。

2005年8月9-16日: 参加在日本海的天然气水合物的调查研究, 负责天然气水合物及孔隙水的样品采集和分析以及沉积物特征的描述。

2002年1月-2002年2月: 参加了于加拿大西北特区麦肯齐三角洲Mallik进行的天然气水合物的钻探及试生产, 负责沉积物中天然气水合物饱和度的现场测量, 以及为进一步的室内地质, 地球化学和化学研究采取样品。

1999年11月-2000年1月: 参加在日本南海海槽的天然气水合物调查, 调查由美国钻井平台MG Hulme实施。在船上负责孔隙水的采取和

化学分析, 沉积物描述以及为后续研究采取微生物, 岩石学和地球化学样品。于航次后开展了天然气水合物相关的地球化学研究。

1997年10月: 参加在日本南海海槽的天然气水合物调查, 调查由俄罗斯Bavenit船实施。在船上负责孔隙水的采取和化学分析, 沉积物描述, 并为航次后的实验研究采取岩石学, 地球化学和微生物相关的样品。

1996年5月: 参加由东京大学海洋研究所的淡青丸在西太平洋南海海槽进行的海洋调查。

1992年5月: 参加由长崎大学长崎丸实施的于东海进行的海洋地质调查。

1991年10月-1993年9月: 在日本冲绳野外调查二叠纪和侏罗纪燧石沉积物。

学术服务:

1. 2014年至今: 中国地质学会非常规能源委员会委员

2. 《海洋地质与第四纪地质》编委

3. 长期为Nature, Journal of Physical Chemistry, Journal of Geophysical Research, Journal of American Chemical Society, Crystal Growth & Design, Earth and Planetary Science Letters, Energy & Fuels, Marine Geology, Organic Geochemistry, Computer & Geosciences, Marine Chemistry, Annals of the New York Academy of Sciences, Geochemical Journal, AAPG Memoir, Applied Geochemistry, IODP Proceeding of Scientific Results, Geological Survey of Canada Bulletin, Terrestrial, Atmospheric and Oceanic Sciences, Journal of Oceanography, Geophysics, Journal of Chemical Thermodynamics, Journal of Chemical and Engineering Data, Environmental Science & Technology, Marine and Petroleum Geology, Industry and Engineering Chemistry Research, Chemical Engineering & Technology等杂志审稿。