In-situ nanoscale geochemical characterization of organic matter in shale by AFM-IR

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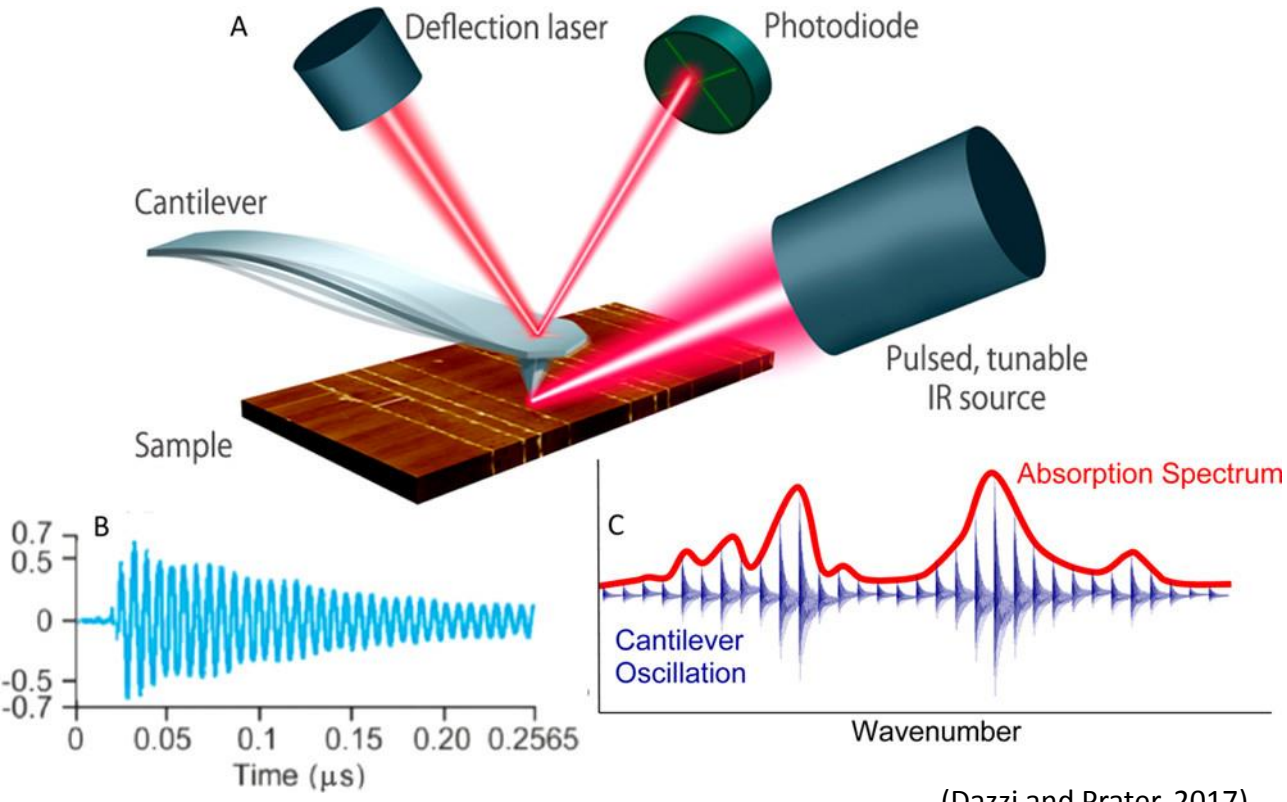
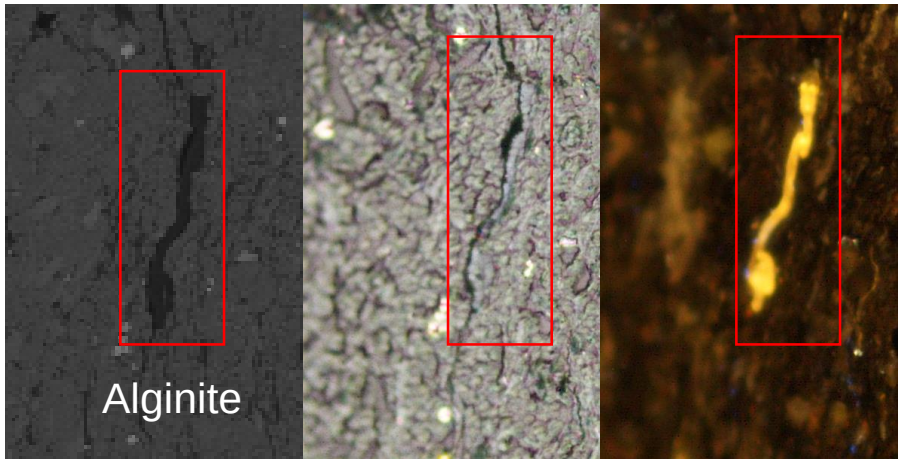
Why AFM-IR?

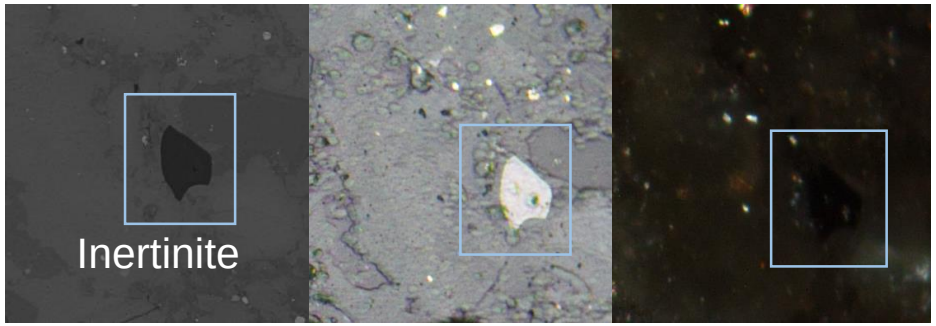


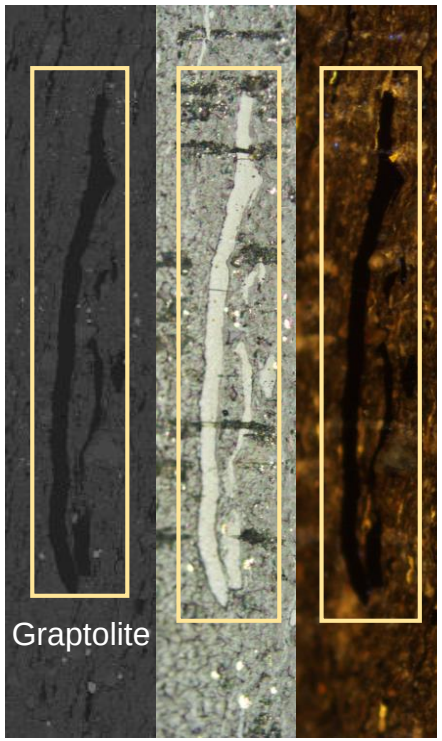
(Dazzi and Prater, 2017)

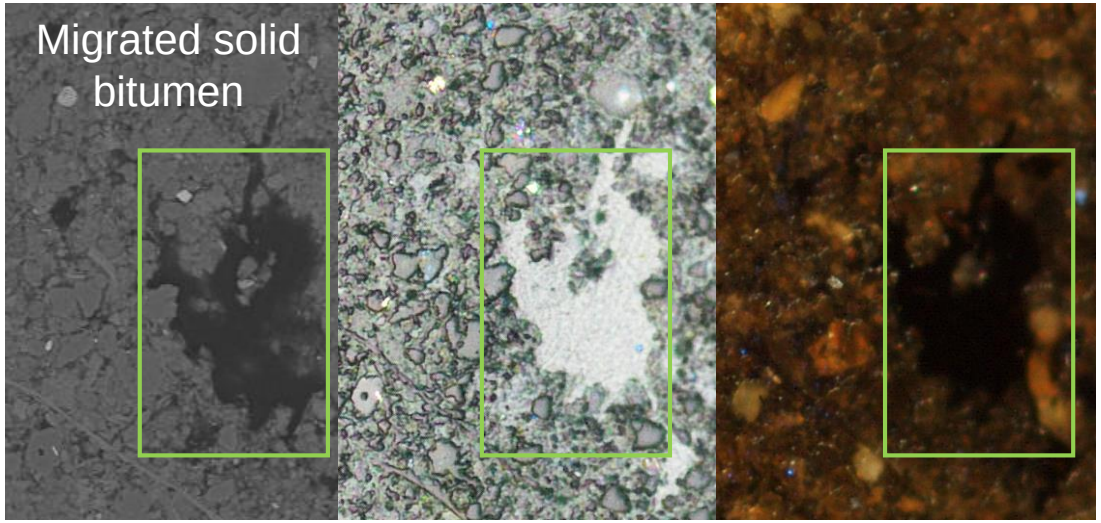
- ❑ Nanoscale geochemical features
- ❑ Characterization of individual particle
- ❑ 2D IR mapping
- ❑ Integrating geochemical and mechanical information

- **It is very challenging to identify OM directly under the optical microscopy mounted on AFM-IR instrument!**
- SEM and optical microscopy should be used to identify OM particles and these are then targeted using AFM

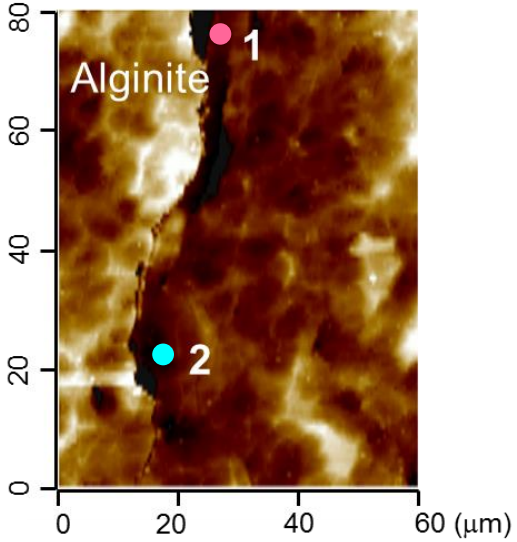


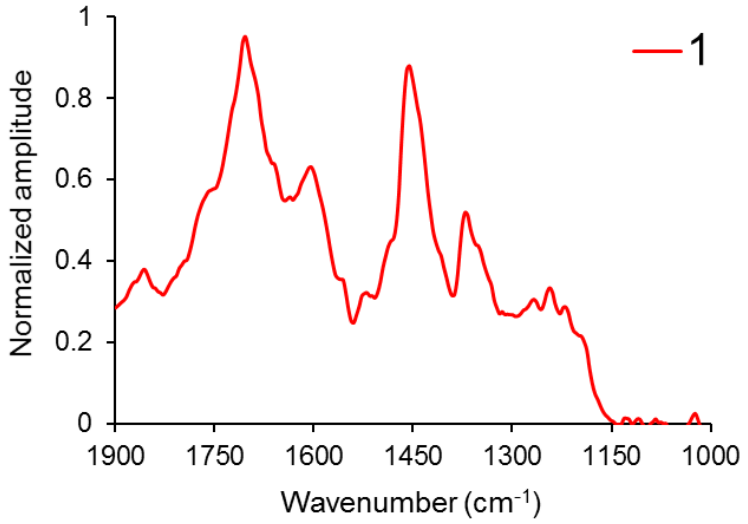


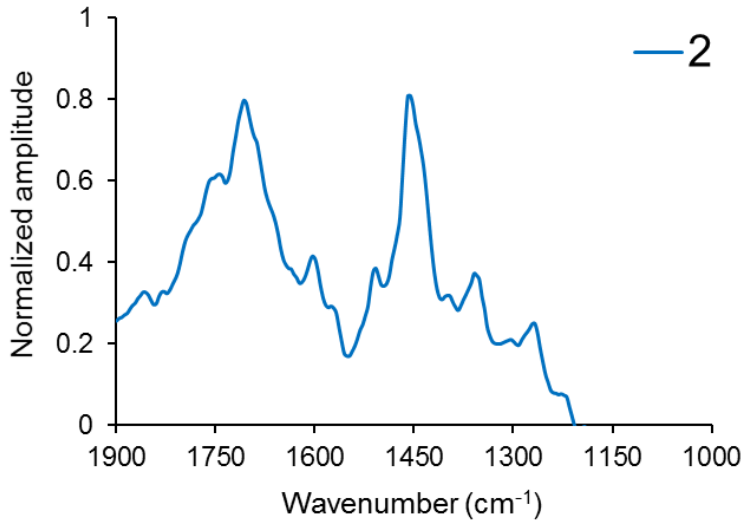


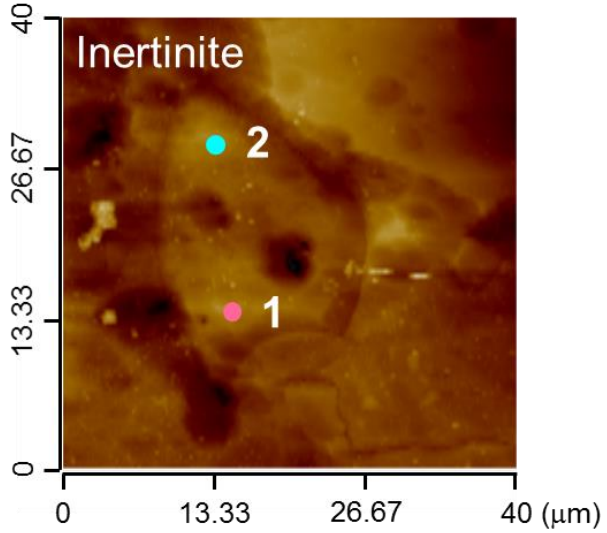


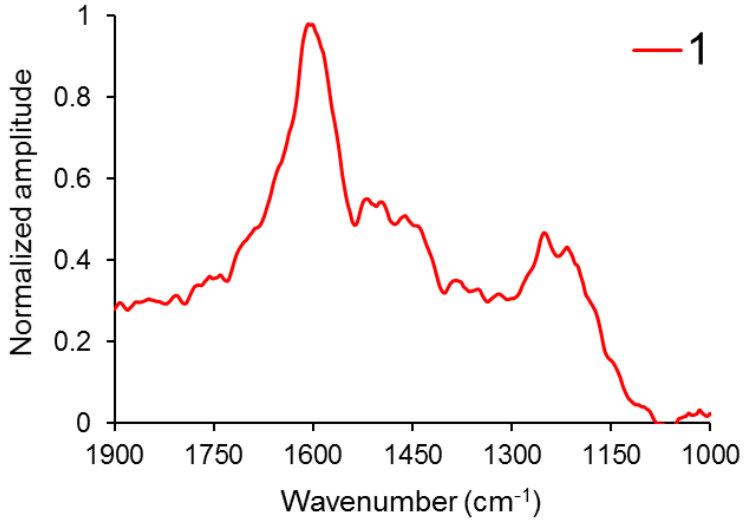
❑ Single point IR measurement

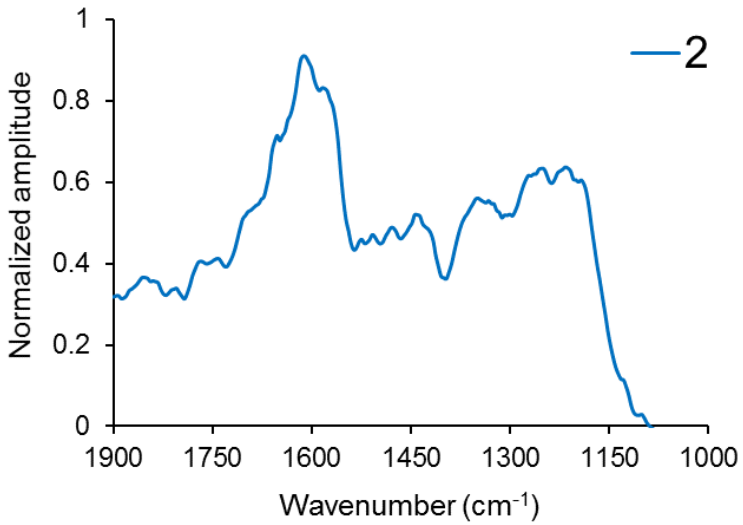












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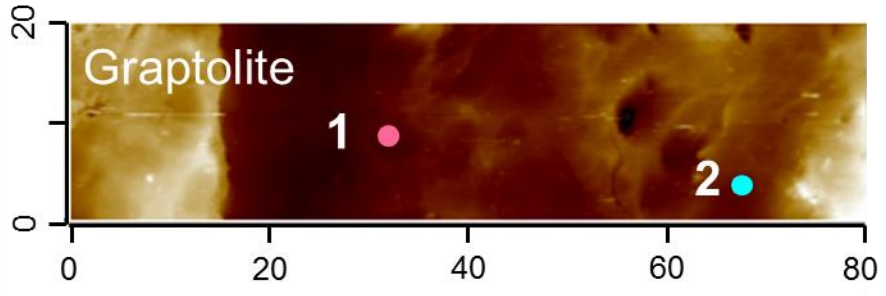
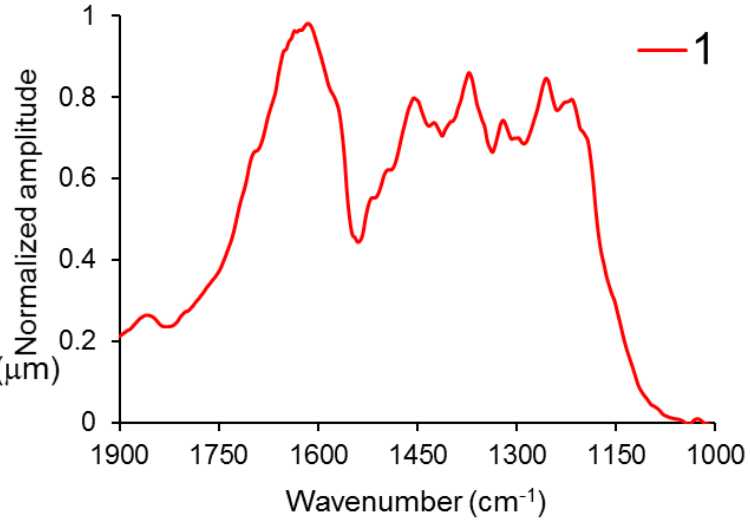
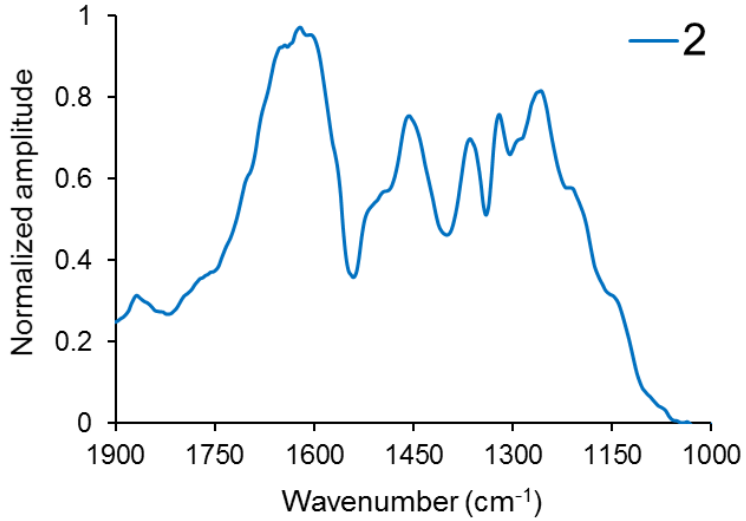
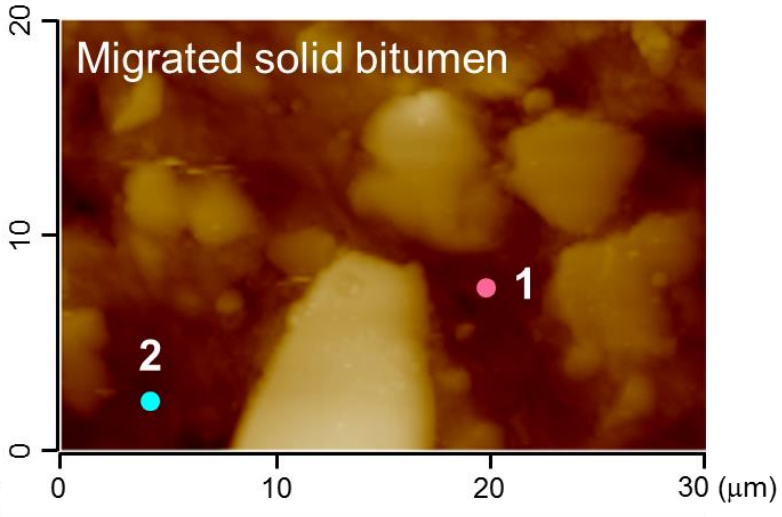
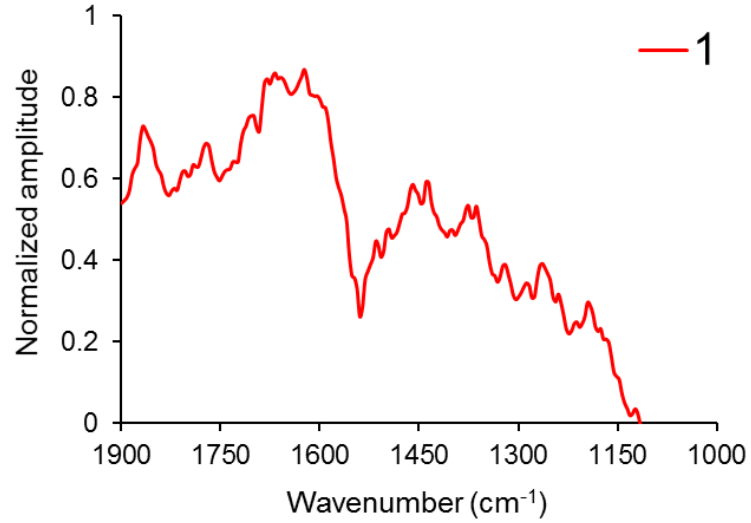
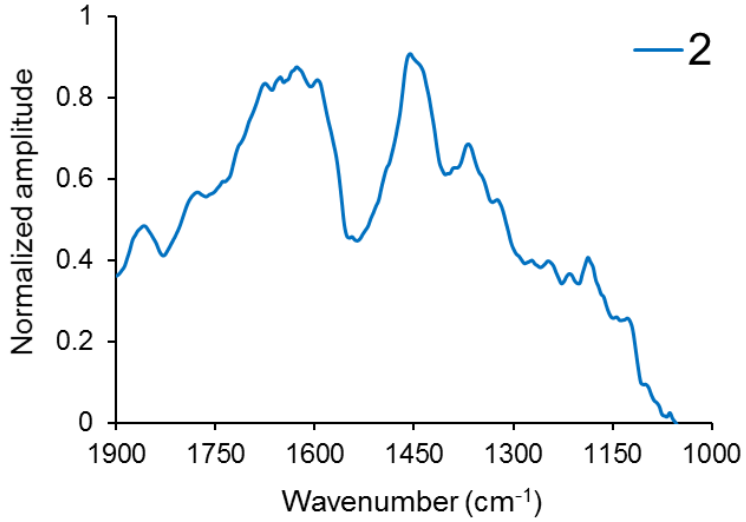




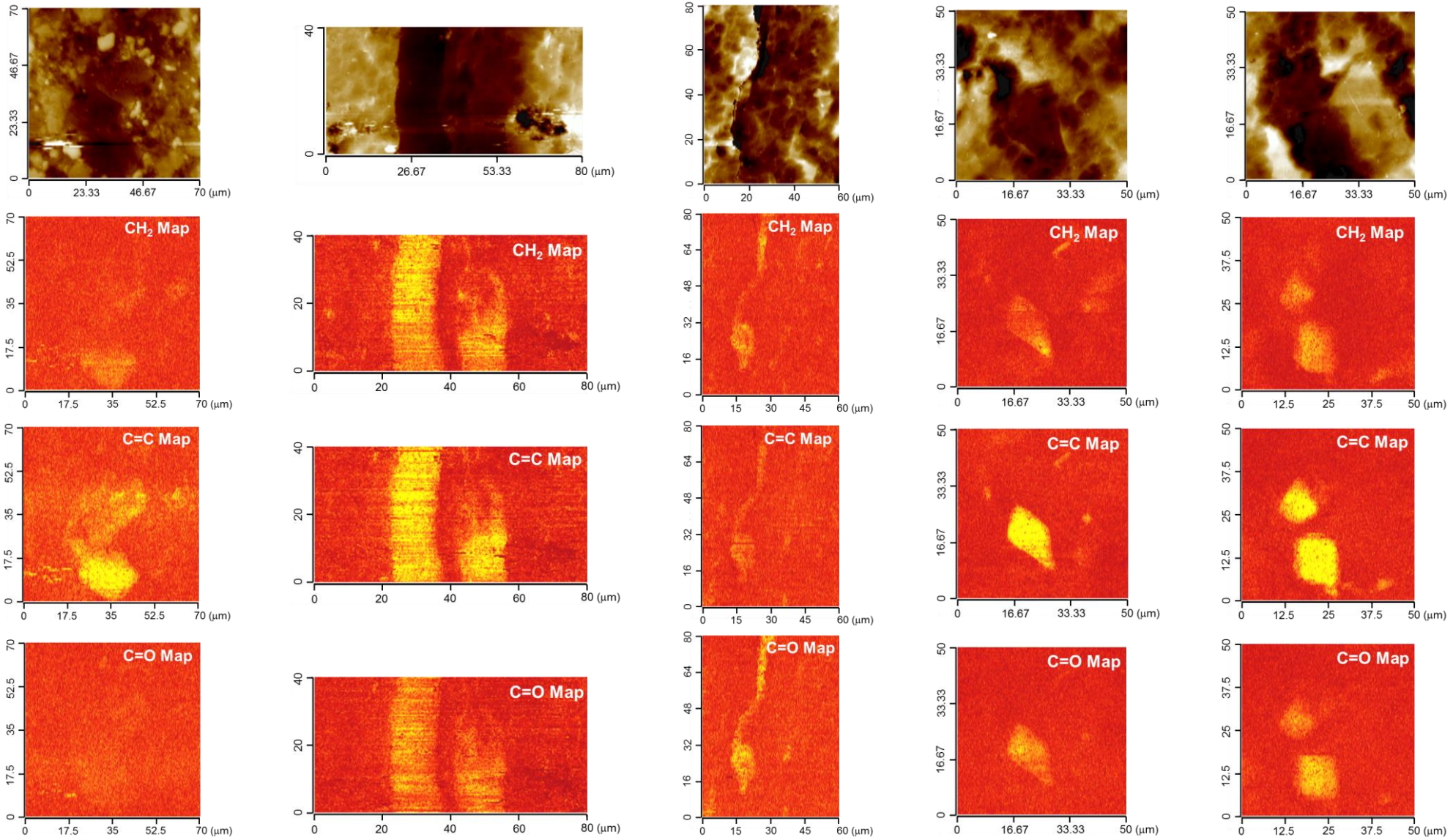




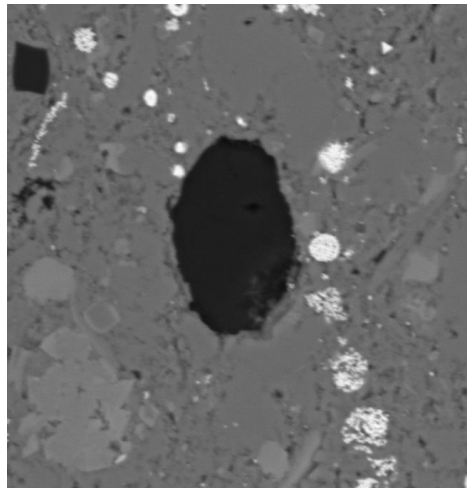


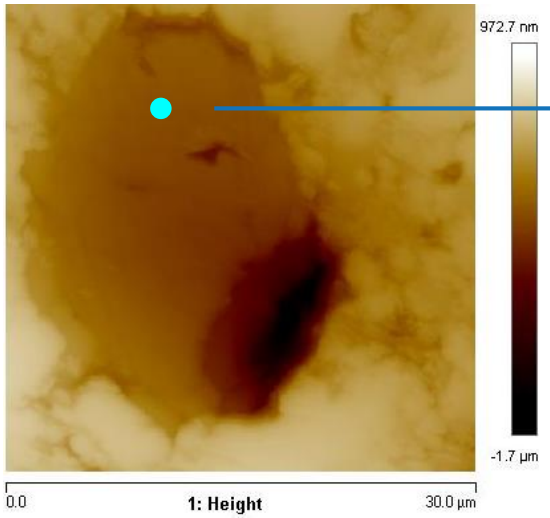


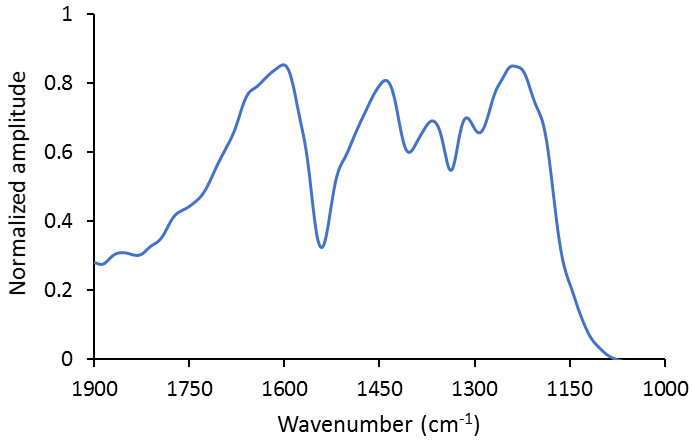
❑ 2D IR mapping

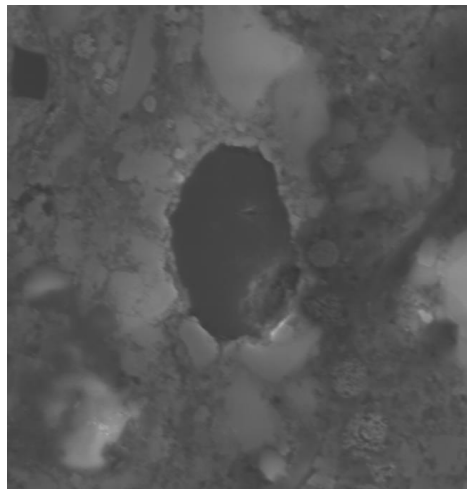


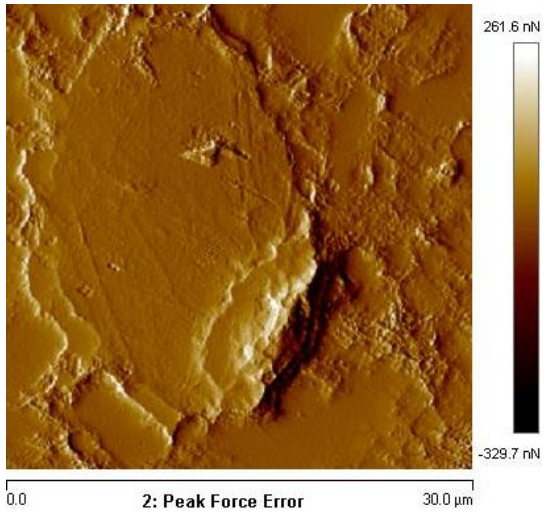
❑Integrating geochemical and mechanical information

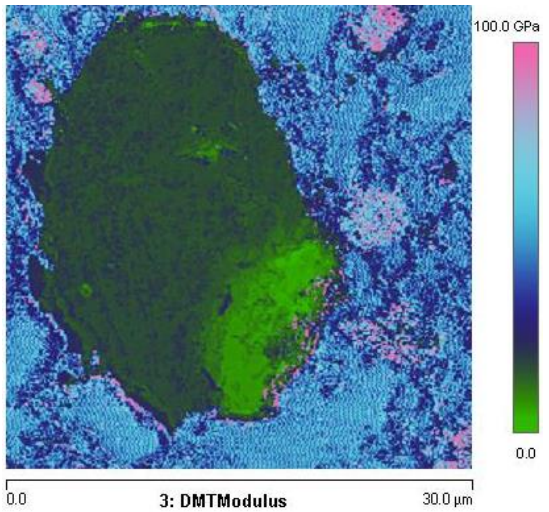








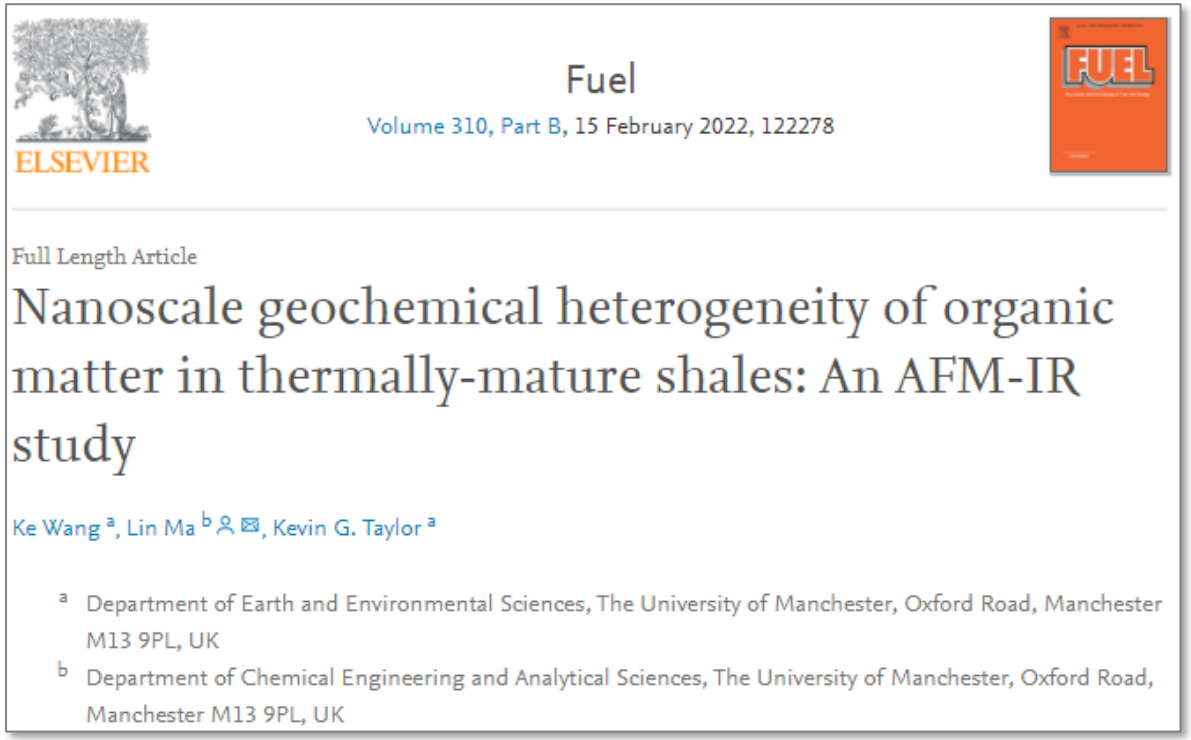




Outlook

Chemical structure changes in subsurface fluid-rock interaction conditions via this advanced technique can be explored in future work, to provide insight into relevant energy applications, such as specific affinity between functional groups of different organic macerals and CO_2/H_2.

Thank you!



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Full Length Article

Nanoscale geochemical heterogeneity of organic matter in thermally-mature shales: An AFM-IR study

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