**Supporting Information**

**for**

# Spectroscopic Study on the Polymer Condensates Formed via Pyrolysis of Levitated Droplets of Dicyanamide-Containing Ionic Liquids

Stephen J. Brotton[1] and Ralf I. Kaiser*[1]

[1] Department of Chemistry, University of Hawaii at Manoa, Honolulu, HI 96822

Table SI. Wavenumbers and possible vibrational mode assignments for the peaks in the near-infrared absorption spectrum from 5500 $cm^{-1}$ to 8000 $cm^{-1}$ produced by an [MAT][DCA] droplet levitated in argon. The letters a) to k) refer to the peak labels in Figure 10. The vibrational mode assignments and peak wavenumbers corresponding to $\nu_1$ - $\nu_{50}$ and $\nu_1^*$ - $\nu_9^*$ are presented in Ref. [28].

| Peak label | Peak wavenumber | Vibrational mode assignment[28] | Predicted combination mode wavenumber[28] |
|---|---|---|---|
| a | 7734 ± 3 | $\nu_7^* + \nu_{48} + \nu_{50}$ | 7746 |
| | | $\nu_9^* + (\nu_6^* + \nu_7^*) + \nu_{50}$ | 7728 |
| b | 7465 ± 4 | $2\,\nu_8^* + \nu_{49}$ | 7479 |
| | | $\nu_{30} + \nu_{47} + \nu_{49}$ | 7478 |
| | | $2\,\nu_9^* + \nu_{47}$ | 7474 |
| | | $\nu_7^* + \nu_{46} + \nu_{48}$ | 7474 |
| | | $\nu_7^* + 2\,\nu_{47}$ | 7470 |
| | | $\nu_{22,23} + 2\,\nu_{50}$ | 7468 |
| | | $\nu_8^* + \nu_9^* + \nu_{48}$ | 7465 |
| | | $\nu_9^* + (\nu_6^* + \nu_7^*) + \nu_{46}$ | 7456 |
| | | $\nu_{30} + 2\,\nu_{48}$ | 7455 |
| | | $\nu_{27} + \nu_{47} + \nu_{50}$ | 7445 |
| c | 7406 ± 3 | $\nu_6^* + \nu_{49} + \nu_{50}$ | 7426 |
| | | $\nu_{30} + \nu_{46} + \nu_{49}$ | 7420 |
| | | $2\,\nu_9^* + \nu_{46}$ | 7416 |
| | | $\nu_{26} + \nu_{48} + \nu_{50}$ | 7414 |
| | | $\nu_7^* + \nu_{46} + \nu_{47}$ | 7412 |
| | | $\nu_8^* + \nu_9^* + \nu_{47}$ | 7403 |
| | | $\nu_{22,23} + \nu_{49} + \nu_{50}$ | 7401 |
| | | $2\,\nu_8^* + \nu_{48}$ | 7394 |
| | | $\nu_{30} + \nu_{47} + \nu_{48}$ | 7393 |
| | | $\nu_{27} + \nu_{46} + \nu_{50}$ | 7387 |
| d | 7320 ± 2 | $\nu_{30} + \nu_{46} + \nu_{48}$ | 7335 |
| | | $\nu_{22,23} + 2\,\nu_{49}$ | 7334 |
| | | $2\,\nu_8^* + \nu_{47}$ | 7332 |
| | | $\nu_{30} + \nu_{47} + \nu_{47}$ | 7331 |
| | | $\nu_{27} + \nu_{46} + \nu_{49}$ | 7320 |
| | | $\nu_{22,23} + \nu_{48} + \nu_{50}$ | 7316 |
| e | 6993 ± 2 | $2\,\nu_{51}$ | 7014 |
| | | $\nu_6^* + \nu_{46} + \nu_{47}$ | 7007 |
| | | $\nu_{18} + \nu_{47} + \nu_{50}$ | 6987 |
| | | $\nu_{22,23} + \nu_{46} + \nu_{47}$ | 6982 |
| | | $\nu_{18} + \nu_{48} + \nu_{49}$ | 6982 |
| | | $\nu_3^* + \nu_{49} + \nu_{49}$ | 6978 |
| | | $\nu_5^* + \nu_{46} + \nu_{50}$ | 6973 |

| | | | |
|---|---|---|---|
| f | 6903 ± 4 | $\nu_{18} + \nu_{47} + \nu_{49}$ | 6920 |
| | | $\nu_5^* + \nu_{46} + \nu_{49}$ | 6906 |
| | | $\nu_3^* + \nu_{47} + \nu_{50}$ | 6898 |
| | | $\nu_{18} + \nu_{48} + \nu_{48}$ | 6897 |
| | | $\nu_3^* + \nu_{48} + \nu_{49}$ | 6893 |
| g | 6407 ± 1 | $\nu_{48} + \nu_{50}$ | 6436 |
| | | $\nu_{27} + \nu_8^* + \nu_{49}$ | 6424 |
| | | $\nu_{22,23} + (\nu_6^* + \nu_7^*) + \nu_{50}$ | 6411 |
| | | $\nu_{27} + \nu_9^* + \nu_{48}$ | 6410 |
| | | $\nu_{26} + \nu_9^* + \nu_{49}$ | 6402 |
| | | $\nu_{26} + \nu_8^* + \nu_{50}$ | 6398 |
| | | $\nu_6^* + \nu_9^* + \nu_{50}$ | 6396 |
| | | $\nu_{30} + \nu_9^* + \nu_{46}$ | 6390 |
| | | $\nu_{27} + (\nu_6^* + \nu_7^*) + \nu_{47}$ | 6388 |
| | | $3\ \nu_8^*$ | 6378 |
| | | $\nu_{47} + \nu_{50}$ | 6374 |
| h | 6161 ± 1 | $\nu_6^* + \nu_8^* + \nu_{48}$ | 6173 |
| | | $\nu_6^* + (\nu_6^* + \nu_7^*) + \nu_{46}$ | 6164 |
| | | $\nu_{46} + \nu_{48}$ | 6164 |
| | | $2\ \nu_{47}$ | 6160 |
| | | $\nu_{22,23} + \nu_9^* + \nu_{47}$ | 6157 |
| | | $\nu_5^* + \nu_9^* + \nu_{50}$ | 6148 |
| | | $\nu_{22,23} + \nu_8^* + \nu_{48}$ | 6148 |
| | | $\nu_{18} + (\nu_6^* + \nu_7^*) + \nu_{50}$ | 6144 |
| i | 6000 ± 1 | $\nu_3^* + \nu_9^* + \nu_{50}$ | 6015 |
| | | $\nu_5^* + \nu_8^* + \nu_{49}$ | 6010 |
| | | $\nu_5^* + \nu_9^* + \nu_{48}$ | 5996 |
| | | $\nu_{45} + \nu_{46}$ | 5993 |
| | | $\nu_{18} + (\nu_6^* + \nu_7^*) + \nu_{48}$ | 5992 |
| | | $\nu_3^* + (\nu_6^* + \nu_7^*) + \nu_{49}$ | 5988 |
| j | 5872 ± 1 | $\nu_{18} + \nu_8^* + \nu_{48}$ | 5881 |
| | | $\nu_3^* + \nu_8^* + \nu_{49}$ | 5877 |
| | | $\nu_5^* + \nu_9^* + \nu_{46}$ | 5876 |
| | | $\nu_{18} + (\nu_6^* + \nu_7^*) + \nu_{46}$ | 5872 |
| | | $\nu_5^* + \nu_8^* + \nu_{47}$ | 5863 |
| k | 5800 ± 1 | $\nu_3^* + \nu_9^* + \nu_{47}$ | 5801 |
| | | $\nu_7^* + 2\ (\nu_6^* + \nu_7^*)$ | 5784 |

The wavenumbers and possible vibrational mode assignments for the peaks a) to k) in Figure 10 are presented in Table S1. If all 31 observed fundamental modes of [MAT][DCA] are considered, then there are 32 combinations of two modes and 1630 combinations of three modes in the 5500 to 8000 $cm^{-1}$ spectral region. In Table S1, we therefore only list the reduced number of combination modes expected to produce larger absorbances.