

DNA using a fluorescent dye. In cells, DNA content is closely proportional to cell number. HepG2 cells were exposed to varying concentrations of metolachlor (0 ppb-control, 50, 100, 300 and 500 ppb) for 48-72 hours to determine the effect of metolachlor on cell proliferation. Standard curves were generated to correlate cell number to fluorescence. Results suggest that similar to fibroblasts, metolachlor exposure results in a decrease in the number of HepG2 cells in culture after 48 and 72 hours of exposure. Additional work is being performed using CFSE (carboxyfluorescein diacetate, succinimidyl ester) to determine the growth rate of control cells compared to metolachlor treated cells.

Abstract #8

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Is a QCM electrode-binding soil phage assemblage less diverse than a 'wild' Bacillus cereus soil phage assemblage?

Recently, phages have been used as affinity reagents in quartz crystal microbalance (QCM)-based biodetection methods. Our goal was to isolate and characterize a *Bacillus cereus* group soil-phage assemblage, which was isolated from 5 grams of local topsoil, and compare its population structure to that of a similar phage assemblage that had been additionally selected by adhering to a QCM electrode. Viruses aren't well-defined in terms of 'species', our operational taxonomic units (OTUs) were defined by structural protein profiles from sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE).. We were able to obtain a conservative estimate of soil-phage 'species' richness and evenness based on the SDS-PAGE profiles.. After analysis, all QCM electrode-binding isolates (N=7) were placed in the same OTU, while the total soil-phage assemblage (N=42) yielded 22 unique OTUs. Simpson's Diversity Index (SDI) of the QCM electrode-binding soil phage assemblage was 1 and roughly 0.016 for the total soil-phage assemblage. Shannon's Index for the electrode-binding soil-phage assemblage was 0 and roughly 2.76 for the total soil-phage assemblage. Using this method, the index values indicate that while the *Bacillus cereus* group soil-phage assemblage was extremely diverse *and* uneven in our sample, the electrode-binding soil phage assemblage was not. Our results show that in our sample species richness was extremely high, the soil-phage assemblage was very uneven and that QCM electrode-binding by a phage seems to be atypical among natural soil phages.

Abstract #9

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Computer simulations of pentane and hexane on graphite at submonolayer coverages

Molecular Dynamics is utilized to simulate hexane (C₆H₁₄) and pentane (C₅H₁₂) on a graphite substrate when the coverages are less than complete. Both systems exhibit four distinct topological regimes which are each tied to unique behavior of oriented domains and therefore to the melting behavior in each regime. Various order parameters, as well as energetic quantities are used to elucidate the point where the system transitions from a vacancy dominated structure to a connected network.

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Abstract #10

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Computer simulations of bullet impact on protective vests

We present the results of Material Point Method (MPM) computer simulations of AK-47 bullet impacts on ceramic / Kevlar protective vests. The algorithm is coded in C++ and involves varying composition and dimensions of the vest as well as the bullets, with up to 1.2 million particles in the simulations. Results suggest that the program is very sensitive to material breaking points and nominally sensitive to finite size effects.