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|  |  | הטכניון - מכון טכנולוגי לישראל  TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY |
| הפקולטה להנדסה כימית  ע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, January 12th, 2022 at 13:30**

**Room #6 and Via zoom** [**https://technion.zoom.us/j/97577956516**](https://technion.zoom.us/j/97577956516)

**Extracellular Matrix**

**Mechanics and Disease States**

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Mammalian cell morphology has been linked to the viscoelastic properties of the adhesion substrate, which is particularly relevant in biological processes such as wound repair and embryonic development where cell spreading and migration are critical. Plastic deformation, degradation, and relaxation of stress are typically coupled in biomaterial systems used to explore these effects, making it unclear which variable drives cell behavior. Here we present a nondegradable polymer architecture that specifically decouples irreversible creep from stress relaxation and modulus. We demonstrate that network plasticity independently controls mesenchymal stem cell spreading through a biphasic relationship dependent on cell-intrinsic forces, and this relationship can be shifted by inhibiting actomyosin contractility. Kinetic Monte Carlo simulations also show strong correlation with experimental cell spreading data as a function of the extracellular matrix (ECM) plasticity. Furthermore, plasticity regulates many ECM adhesion and remodeling genes. Altogether, these findings confirm a key role for matrix plasticity in stem cell and immune cell biophysics, and we anticipate this will have ramifications in the design of biomaterials to enhance therapeutic applications and disease diagnostics.