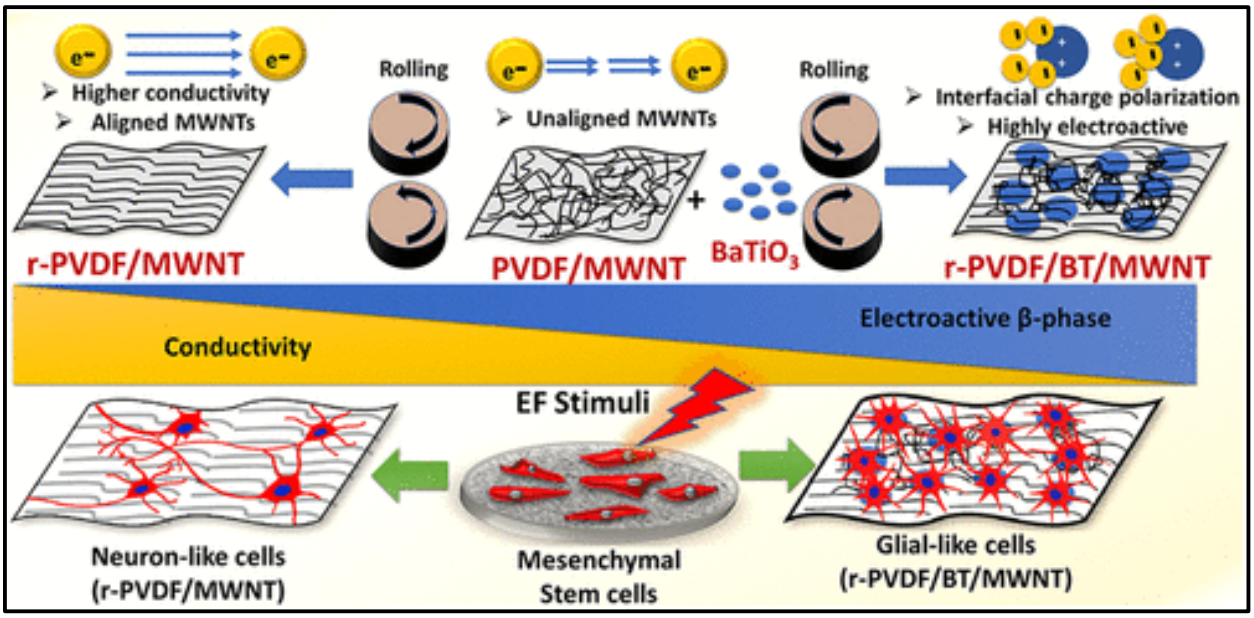
Asish Kumar Panda, Ravikumar K, Amanuel Gebrekrstos, Suryasarathi Bose, Yogananda S. Markandeya, Bhupesh Mehta, and Bikramjit Basu, Tuneable substrate functionalities direct stem cell fate towards electrophysiologically distinguishable neuron-like and glial-like cells; **ACS Applied Materials & Interfaces** 13[1] (2021) 164-185.

Graphical Summary:



Significance/Impact:

One of the central themes in regenerative engineering is to program the stem cell fate using biophysical cues on a functional platform. In collaboration with neuroscientists, this work unveils complex yet synergistic interaction of substrate functional properties to direct EF-mediated differentiation toward neuron-like and glial-like cells, with distinguishable electrophysiological responses. The functionalities of PVDF have been tuned using conducting nanofillers (multiwall-carbon nanotube) and piezoceramic ($BaTiO_3$) by an optimized processing approach (melt mixing-compression molding-rolling). Mechanistically, the roles of intracellular reactive oxygen species (ROS), Ca^{2+} oscillations, and synaptic and gap junction proteins in directing the cellular fate are established.