Biological filters are awesome.

An example is the NPC.

We sought to determine which minimal features from the NPC that could be generalized to others systems were sufficient for NPC transport.

Combining theory and experiments we determined that bound diffusion resulting from……tethers

Selective biofilters are counterintuitive when they permit rapid transport of highly selective proteins.

Selective biofilters are essential to life.

Selective biofilters control the transport of lots of kinds of molecules.

There are a lot of selective filters in living systems.

There are a lot of cool selective filters in living systems.

Selective filtering lets molecules move where they need to go.

Living systems need selective filters to direct molecular traffic.

Selective biofilters are interesting because they must balance specificity with speed of transport.

Living systems use selective filtering to direct molecular traffic, balancing specificity with speed of transport. One example of an unusual biofilter is the nuclear pore complex (NPC), which controls transport of macromolecules between a cell’s nucleus and cytoplasm. The NPC is a channel lined with disordered FG nucleoporin proteins, which block the passage of most macromolecules but allow a high flux of transport factor proteins and their cargo. We sought to determine minimal features from the NPC which were sufficient for selective transport and could be generalized to other biofilters. Combining modeling and experiment, we determined that selectivity can arise from bound-state diffusion resulting from transient, multivalent binding interactions to flexible molecular tethers.