

Design of Cultured Neuron Networks *in vitro* with Predefined Connectivity Using Asymmetric Microfluidic Channels

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Video Legends

- S1. An example of neurite growth in a microchannel composed of medium “Zig-zag” shaped segments (100 μm in length).
- S2. An example of neurite growth in a microchannel composed of large “Zig-zag” shaped segments (200 μm in length).
- S3. An example of neurite growth in a microchannel composed of “triangle” shaped segments (66 μm in length).
- S4. Neurites growing “backward” from the *Target* culture alongside the neurite grown from the *Source*.
- S5. An example of neurite growth in a microchannel composed of “Spine” shaped segments (100 μm in length).
- S6. Visible single neurites and actual complex dynamics of a bundle of fibres in a microchannel composed of “triangle” shaped segments (100 μm in length).
- S7. Time-lapse images of one of the propagating bursts from the *Source* chamber to the *Target*. Each square corresponds to the MEA electrode site and the colour grade encodes the number of spikes within every 5 ms time bin of the spiking activity during the burst.
- S8. Bursting activity recruited the neurons in the *Target* chamber and in the microchannels, but no spikes were observed in the *Source* chamber. Each square corresponds to the MEA electrode site and the colour grade encodes the number of spikes within every 5 ms time bin of the spiking activity during the burst.
- S9. An example of an axon that changes the growth direction and turns its growth angle up to 180 degrees in a large size “Zig-zag” shaped segment (200 μm in length).
- S10. An example of an axon that overcomes “trap” shapes and changes growth direction by turning its growth angle up to 180 degrees in medium size “Zig-zag” shaped segments (100 μm in length).