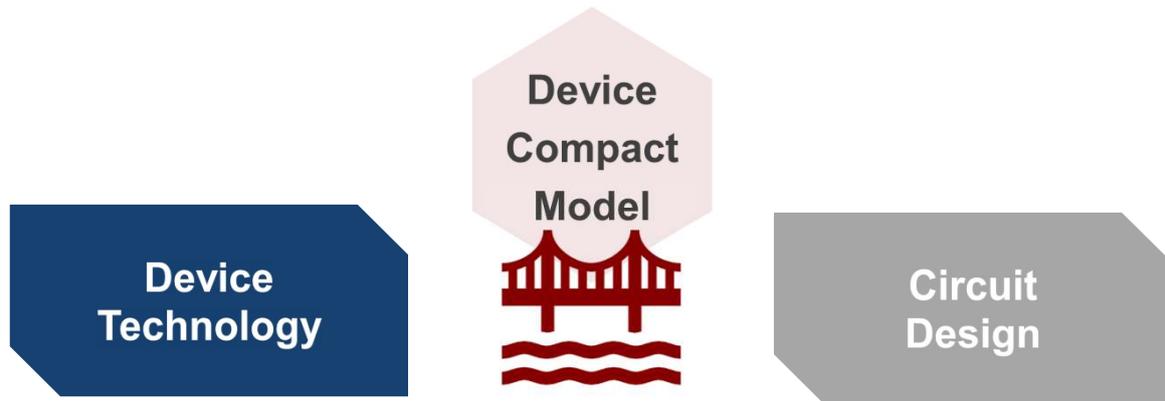




AI Solution
for Semiconductor Modeling

BACKGROUND



- **Device compact models allow circuit-level evaluation of novel devices.**

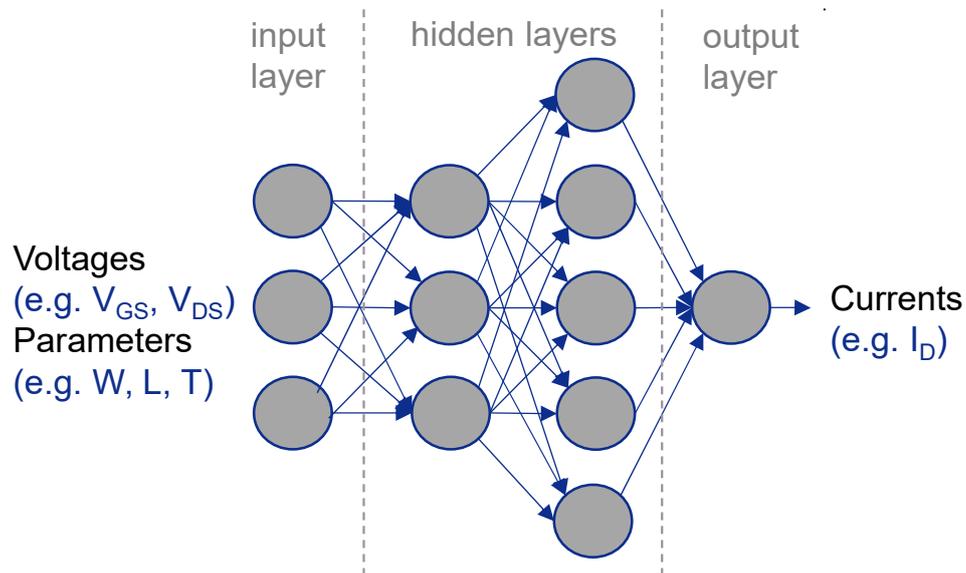
When you come up with a brilliant idea for a novel device, you first confirm the gain at the device-level by actually fabricating the device or by TCAD (Technology Computer-Aided Design) simulation. The important question that follows is whether this device results in the desired gain **at the circuit level**, where it will actually be used in a product. Device compact models act as a bridge between the fabricated or simulated device and the circuit simulations, enabling circuit simulations with the behavior of the novel device reflected in the model.

- **Physics-based analytical models, the most widely used models today, not only take months to years to develop but are also limited in accuracy.**

To model a novel device, it can take **months to years** by world-class researchers to develop equations that correctly reflect its behavior. Also, these equations involve fitting parameters that must be extracted from measured/TCAD data, a process which can take **another few days to weeks** by expert modeling engineers. Moreover, since the equations cannot capture all the physics involved in the operation, the **accuracy of the model is limited**. Thus, **months to years is needed before we can evaluate the circuit-level impact of the novel device. Even then, the accuracy of the result is questionable.**

OUR TECHNOLOGY

Fast & Accurate Semiconductor Device Modeling Using Artificial Neural Network Based **Neural Compact Models**



- **Neural compact model is automatically generated from data, allowing fast and accurate modeling.**

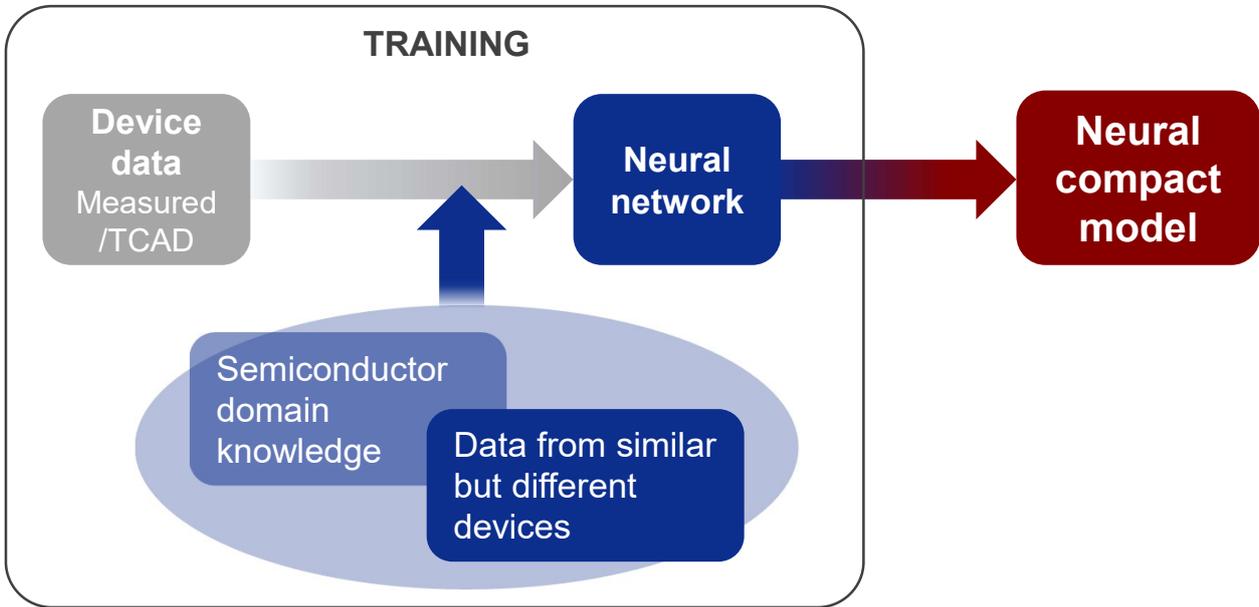
An artificial neural network (ANN) can approximate any function, so neural compact models using ANN can replace physics-based analytical models. The ANN is trained with measured/TCAD data, after which the desired output value (e.g. current) is inferred depending on the input value (e.g. bias voltages, temperature). **Model generation time is drastically reduced.** Training for simple data regression can be done in the order of hours or less, and inference in the order of seconds or less. Also, since it is data-based, the model can be **very accurate**, automatically involving all the physics involved. Thus, if device-level measured/TCAD data is available, **circuit-level performance evaluation capability is dramatically improved.**

- **Beyond simple data regression, more advanced machine learning techniques are used to accommodate situations where data is not sufficient, which is often the reality.**

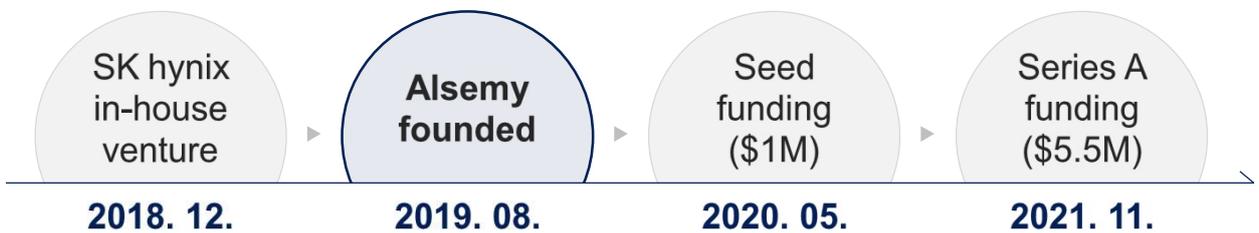
The capability of machine learning is strongly dependent on the available data; however, data is rarely available in the desired amount. Therefore, simple data regression can lead to unphysical models. Thus more advanced machine learning techniques are developed to incorporate prior semiconductor domain knowledge from experts or by training with data from similar but different devices with a lot of data.

PRODUCT

Alsis – Software that takes semiconductor device measured/TCAD data as input and generates compact models as output for circuit simulation



COMPANY PROFILE



www.alsemy.com



contacts@alsemy.com