

Consultant Report

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PARTEC -International Congress on Particle Technology

POWTECH is the international exhibition for powder processing and handling, which is held with *PARTEC* ever three years at Nuremberg, Germany.

PARTEC 2019 was chaired by Prof. Stefan Heinrich from Hamburg University of Technology.

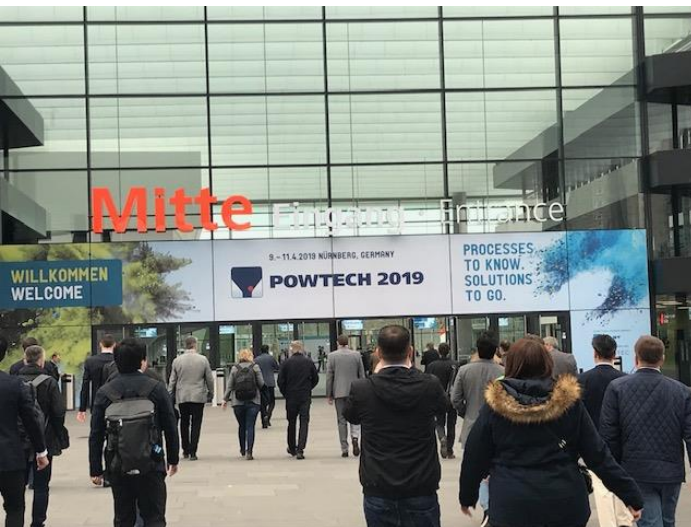
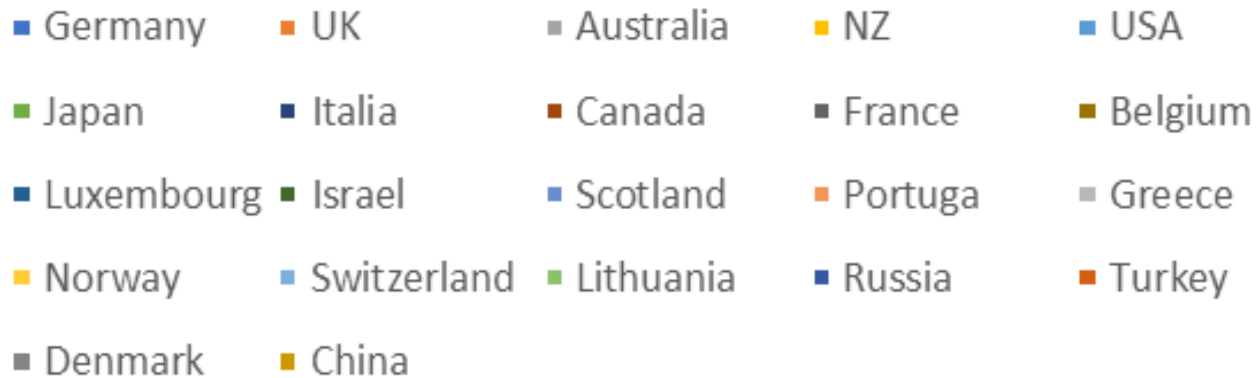
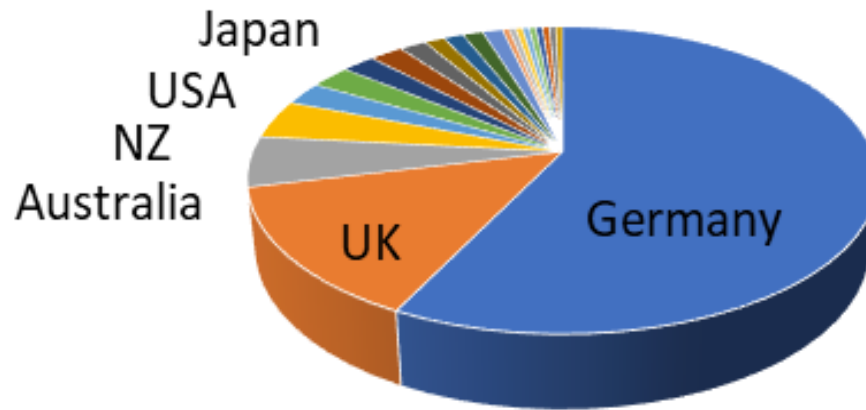


Fig.1 Number of Speakers by country



- 244 oral presentations and 169 poster presentations in the four-day conference.
- Speakers were gathered from 22 countries.
- Approximately 80% of the total speakers came from Europe.
- 57% of the total speakers were from Germany.

Table 1 The number of oral presentations in each session

Sesseion	No. of speakers	Ratio of speakers
<u>Modelling and Simulation</u>	40	16.4%
<u>Particle Technology for Pharmaceuticals</u>	19	7.8%
Fluidization and Multiphase Flow	18	7.4%
Characterization of Particles	17	7.0%
Particle and Bulk Powder Characterizatio	17	7.0%
Agglomeration and Granulation	16	6.6%
Particle Interactions and Interfaces	12	4.9%
Application of Particle Technology	11	4.5%
Formation and Synthesis of Particles	10	4.1%
Seperation	10	4.1%
Handling and Flow of Particulate Systems	9	3.7%
Particles for Additive Manufacturing	9	3.7%
Comminution	9	3.7%
DynSim SPP 1679	8	3.3%
Nano Hybrids	8	3.3%
Particle Design and Functionalization	7	2.9%
Interface Properties	6	2.5%
Mechanics of Particulate Solids	5	2.0%
Handling and Flow of Particulate Systems	4	1.6%
Mixing	3	1.2%
Particle Technology for Energy Systems	3	1.2%
Life and Food Science	3	1.2%
(Total)	244	100.0%



Session of “Modeling and Simulation” gathered largest number of presentation (Total 40 presentations).

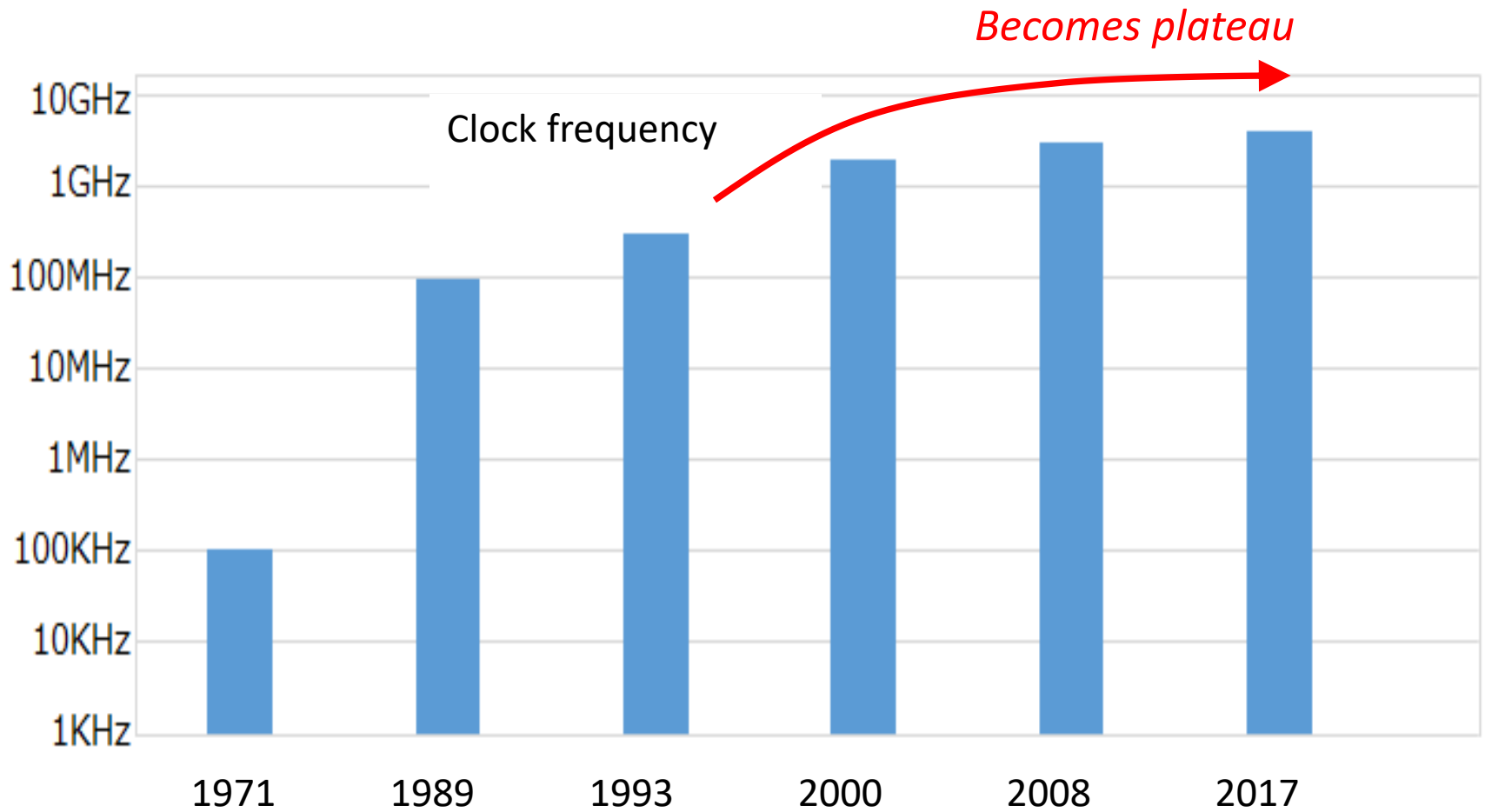
Among the total 40 presentations in this session, 60% of the presentations were related to DEM (Discrete Element Simulation).

Presentations related to DEM simulation can also be seen in other sessions.

It is obvious that the DEM is one of the major topics in powder technology.

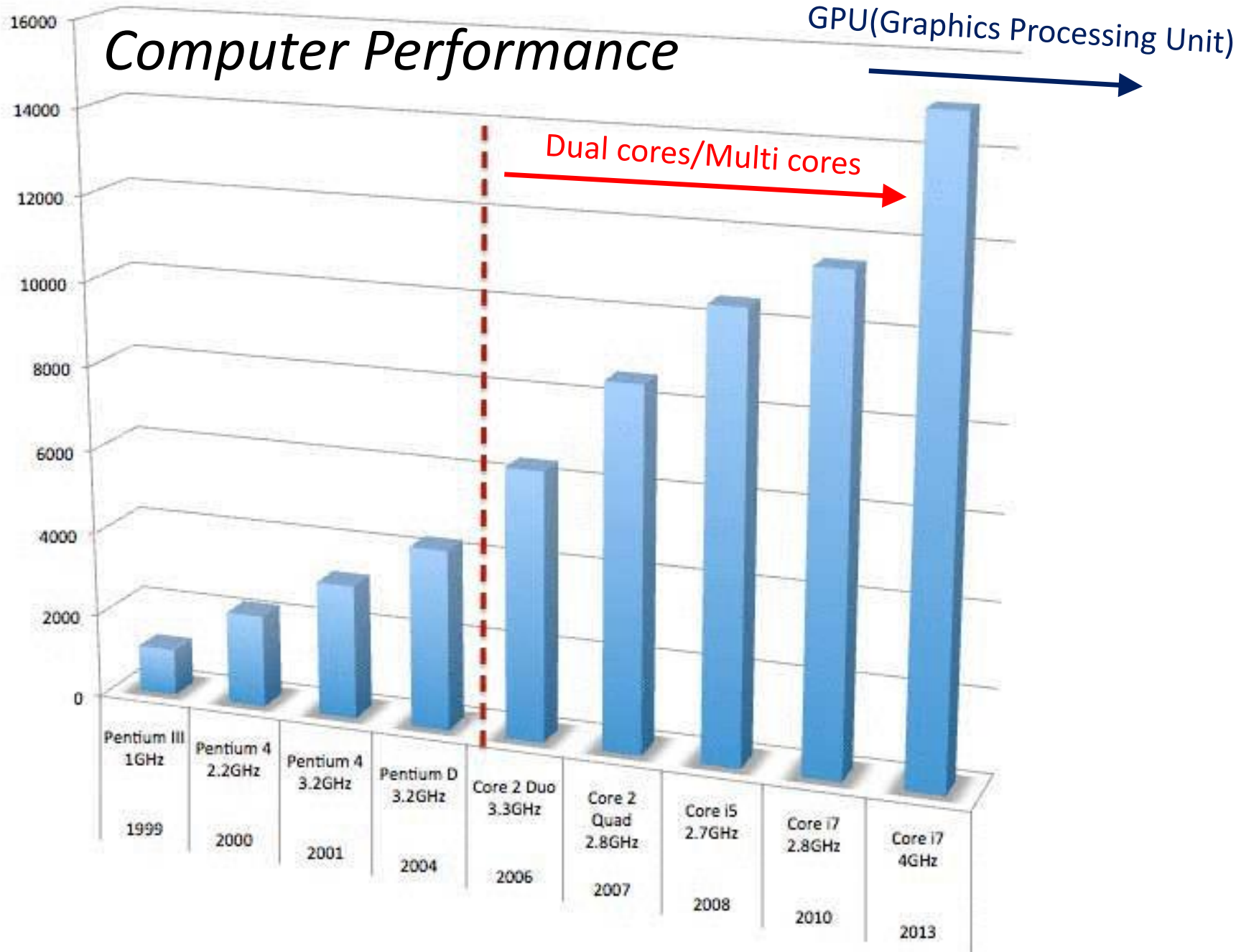
Advance in DEM Simulation

Growth of CPU



Computer Performance

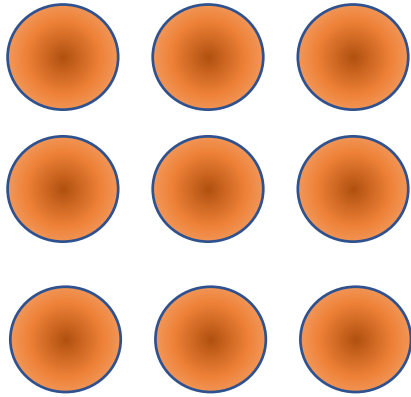
GPU(Graphics Processing Unit)



Future of modeling, simulation, data processing

1 ℓ mixing DEM calculation with PC

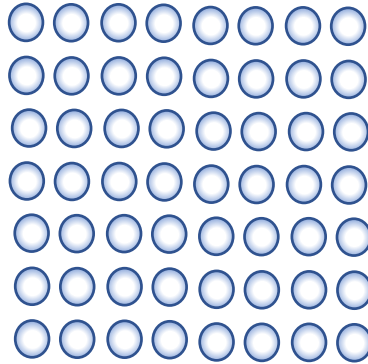
2005



3 mm \times 10,000 particles

Single-core

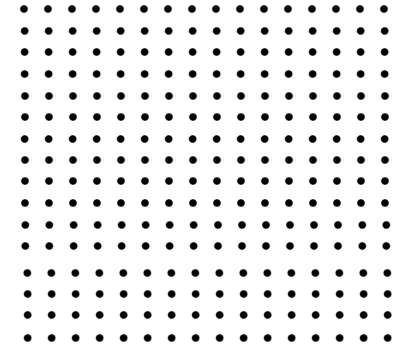
2015



300 μ m \times 10,000,000 particles

Multi-core
Single GPU

2019



70 μ m \times 1.0B particles

Multi-core
Multi-GPU

Simulation of powder processing can be conducted in almost real particle size !!

Expected Technology

- Precise contact model (particle adhesion force)
- Introduction of surface property
- Particle deformation

Use of IoT and AI in powder technology

In general, enormous experimental data (so called **BIG data**) of powder processing contains fluctuation components. By using the AI technology, only the fluctuation component can be eliminated while leaving the tendency.

Determination of optimal operating parameter, increase in processing capacity, and improvement of energy consumption efficiency can be conducted by using the **BIG data with AI**.

Prediction of complicated powder behavior and **scaling-up** characteristics are also possible by using the AI with automatic learning function such as **Neural Network (NN)**.

Also, **precise control** of powder processing can be realized by using control algorithms such as fuzzy logic and NN.

It is expected that number of researches regarding the IoT and AI will increase more and more in powder technology.



NEWS

Future of gasoline engine

German Government Voted to Stop Internal Combustion Engines in EU by 2030.

Oct.6, 2016

U.K. pledged to stop the sale of new gasoline and diesel cars by 2040, following a similar move by France.

July 26, 2017



Model S (Tesla)

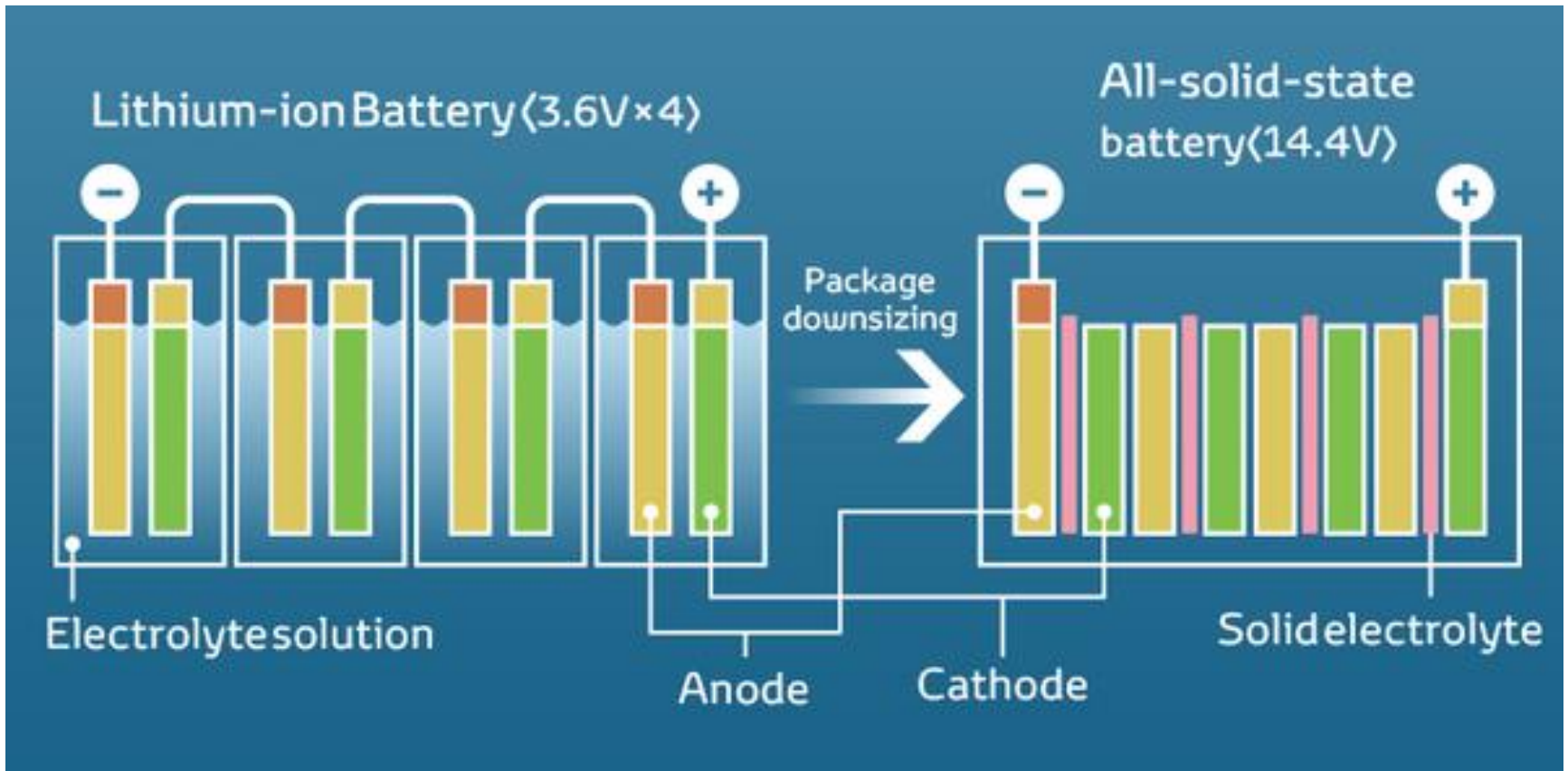


AA battery size



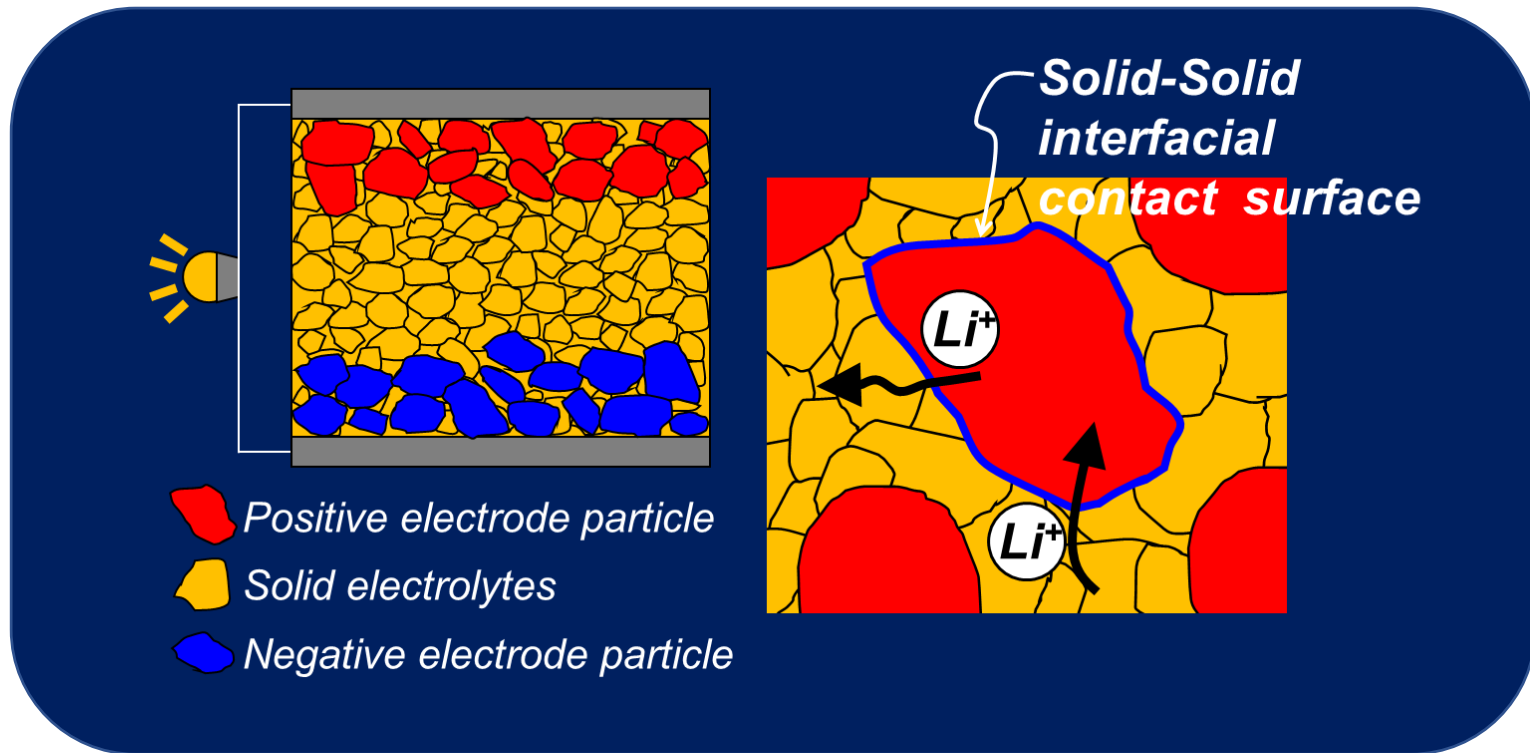
7,000 batteries are installed under body





Flammable electrolyte solution causes liquid leak and explosion

Ideal electrode structure for all solid Lithium Ion battery



- Transfer of Li^+ ions only occurs at the interfacial contact between electrode particles and solid electrolytes
- This requires well-designed electrode structure, in which the electrode particle contacts with the solid electrolytes

***Announcement for
The 8th Asian Particle Technology
(APT2021)***

**October 11 (Mon.)~14 (Thr.)
2021**

Conference Chair: S. Watano



*Bullet train
(SHINKANSEN)*



Osaka → Kyoto 15min
Osaka → Nagoya 1.0 hrs
Osaka → Tokyo 2.5 hrs



Kyoto **Nagoya** ○ **Tokyo**

Osaka



USJ Japan



Osaka Castle



Intex Osaka



Kansai Int. airport

Osaka Prefecture



Osaka Prefecture University

tentative



INTEX OSAKA

International Exhibition Center

POWTEX OSAKA 2021 in October

The 14th Powder Technology Exhibition Osaka.





See you in Osaka Japan 2021

