

ASPI's Critical Technology Tracker

The global race for future power

Technology	Lead country
Advanced materials and manufacturing	
1. Nanoscale materials and manufacturing	China
2. Coatings	China
3. Smart materials	China
4. Advanced composite materials	China
5. Novel metamaterials	China
6. High-specification machining processes	China
7. Advanced explosives and energetic materials	China
8. Critical minerals extraction and processing	China
9. Advanced magnets and superconductors	China
10. Advanced protection	China
11. Continuous flow chemical synthesis	China
12. Additive manufacturing (incl. 3D printing)	China
Artificial intelligence, computing and communications	
13. Advanced radiofrequency communications (incl. 5G and 6G)	China
14. Advanced optical communications	China
15. Artificial intelligence (AI) algorithms and hardware accelerators	China
16. Distributed ledgers	China
17. Advanced data analytics	China
18. Machine learning (incl. neural networks and deep learning)	China
19. Protective cybersecurity technologies	China
20. High performance computing	USA
21. Advanced integrated circuit design and fabrication	USA
22. Natural language processing (incl. speech and text recognition and analysis)	USA
Energy and environment	

Energy and environment	
23. Hydrogen and ammonia for power	China
24. Supercapacitors	China
25. Electric batteries	China
26. Photovoltaics	China
27. Nuclear waste management and recycling	China
28. Directed energy technologies	China
29. Biofuels	China
30. Nuclear energy	China
Quantum	
31. Quantum computing	USA
32. Post-quantum cryptography	China
33. Quantum communications (incl. quantum key distribution)	China
34. Quantum sensors	China
Biotechnology, gene technology and vaccines	
35. Synthetic biology	China
36. Biological manufacturing	China
37. Vaccines and medical countermeasures	USA
Sensing, timing and navigation	
38. Photonic sensors	China
Defence, space, robotics and transportation	
39. Advanced aircraft engines (incl. hypersonics)	China
40. Drones, swarming and collaborative robots	China
41. Small satellites	USA
42. Autonomous systems operation technology	China
43. Advanced robotics	China
44. Space launch systems	USA

QuantumBasel

These findings should be a wake-up call for democratic nations, who must rapidly pursue a strategic critical technology step-up.