

Document: Innovations bring a maze of complexities to a sport, but elevate the performance level of an athlete and reduce the chances of injury, making sport more enjoyable for the spectators and the athletes.

In recent time, the sports equipment industry has emerged as a sophisticated yet commercially viable hi-tech industry where advances have revolutionized sports. Additionally, various world-level championships like Olympics and World Cups have popularized the sports equipment industry up to a great extent, making it a lucrative business.

Table : Added advantages of incorporated nanomaterials in sporting equipment.

The famous tennis player, Roger Federer has won many tournaments including Wimbledon using nano-enhanced racquets. These racquets are more stable; stronger and have 22% more ball-hitting power than other non-nano based racquets. The nano particles also impart flexibility control for skiing, allowing much slicker rides and turns.

Equipment such as footballs/tennis balls with nano-clay lining as a barrier material uphold pressure for a longer game-play. Incorporation of nanomaterials (e.g. fullerene) lightens the golf clubs by lowering the centre of gravity, which increases the power and accuracy during the game-play. Graphene oxide is incorporated into canoes or race-boat hulls/masts to increase glide while making them stronger and much lighter.

In Formula One Motor racing, where race largely depends on the motor body-weight and type of tyres, lighter-weight and better-wearing nanocomposite products are being seized upon. Also, nanoparticles of ZrO₂, ZnO, CuO, etc. are used in lubricants for reducing wear and friction, carbon nanofibers are being incorporated in breaks and nano-based paints are used for thermal resistance and aerodynamic drag reduction.

Nanotechnology being a disruptive technology has impacted every sphere of our daily life and sport is no exception. Nano-enhanced sporting equipment are much more performance-enhancing and superior in terms of strength, stiffness, and durability as compared to conventional sporting equipment. Various companies are coming up with more innovative ideas to implement nanotechnology for improving sports equipment even further.



Fig. 1: Nanotechnology advantages in sports equipment. (Image: Wikimedia Commons)

Nanomaterial	Sport	Benefits
Carbon nanotubes	Tennis/ Badminton	Increase stiffness, consistency, durability, resiliency, impact, repulsion power and vibration control of racquets
	Golf	Reduce weight, lower torque/spin of clubs
	Kayaking	Enhance abrasion/crack resistance and easy paddling in kayaks
	Archery	Better vibration control in arrows
Silica nanoparticles	Tennis/ Badminton	Increase stability, power & durability of racquets
	Skiing	Decrease torsion index & facilitate transition in skis
	Fly-fishing	Enhance hoop & flex strength of rods
Fullerenes	Tennis/ Badminton	Reduce weight and twisting of racquet frames
	Golf	Facilitate flexible club whipping
	Bowling	Reduce chipping & cracking of balls
Carbon nanofibers	Cycling	Reduce weight and increase stiffness of bicycles
Nanoclay	Tennis/Golf	Increase resiliency and bounce of balls
	Watercraft	Reduce weight and enhance speed of water-boats
Nano-titanium	Tennis/ Badminton	Resist deformation and increase strength & durability of racquets, transmit more power to shuttlecock/ball, more accurate shots

From *Nanowerk Spotlight*, Posted: May 27, 2013

Main ideas:

Advantages over another athlete; how to manage to decide between two athletes; limits; less or different injuries; uses “new materials” in the everyday life.

Other tracks:

Benefits in other fields; dangers; renewable; based on the nature.