Teeing Off With an Entirely New Material

When plastic was first introduced, people were fascinated by its possibilities. They watched as a new material evolved and extended its applicable uses into thousands of facets of our daily lives. A new technology, known as the Liquidmetal® alloy, is the result of a project funded by the California Institute of Technology (CalTech) in conjunction with NASA's Jet Propulsion Laboratory. Professor Bill Johnson and Dr. Atakan Peker of CalTech discovered the material while working on a research project in 1992. Industry professionals believe that this invention will change the way the world thinks of vitrified metals—similar to the way plastics have.

The Liquidmetal alloy is part of an entirely new class of vitrified metals, and is also known as metallic glass, or Vitreloy.® A vitrified metal is a frozen liquid that fails to crystallize during solidification, unlike common metals such as titanium, steel, and aluminum. Essentially, the technology takes the non-crystalline structure of glass and combines it with the properties of metal, a combination not found in nature, allowing for a product that offers the strength of a metal with the elasticity of a polymer. This unique technology is more than twice as strong as titanium and has a higher elastic limit.

The Liquidmetal® Golf family of clubs offers unsurpassed playing capabilities due to the unique nature of the innovative Liquidmetal® technology.

The fundamental technology behind the Liquidmetal alloy is owned by CalTech and is exclusively licensed to Liquidmetal® Technologies of Lake Forest, California. A spinoff from its parent company, Liquidmetal® Golf presents this space-age development in a complete line golf clubs that are changing the face of the game.

The unique technology is an innovative blend of titanium, zirconium, nickel, copper, and beryllium that allows for properties not achievable with other materials. It is more than twice as strong as titanium, highly resistant to deformation, and has no weak spots, providing for almost total energy transfer. It is also more comfortable to use than a standard golf club. When compared to other golf clubs on the market, clubs made with this technology have a lower vibration response along with a softer, more solid feel. Because less energy is absorbed by the club's head upon impact, more energy is transferred directly to the ball.

The increased energy transfer can also be accredited to the material's lack of atom alignment. Other metals used in golf clubs are aligned in recurring patterns. The sections where these patterns touch are known as grain boundaries that lead to the absorption of energy as opposed to its transfer. Liquidmetal alloy atoms are not aligned, therefore no connecting patterns exist—consequently, golfers can drive the ball longer and straighter than before. Presently, these unique clubs are used by some of professional golf's top players.

Vitreloy was designed for the space program and is used aboard the NASA Genesis spacecraft, as well as numerous Shuttle missions. NASA will also be using it in the construction of a drill that will help astronauts search for water beneath the surface of Mars.

Of course, Vitreloy also has other potential commercial uses. For the recreation industry, it means a whole wave of improved products in sporting equipment: tennis rackets, bicycle frames, baseball bats, and the list goes on. Because it is also biocompatible, the material may find applications in the medical industry for the manufacturing of surgical instruments and prosthetics. The Liquidmetal alloy is projected to replace many high performance materials, such as titanium, in many diverse applications. These applications include numerous opportunities in the industries of aerospace, defense, military, automotives, medical instrumentation, and sporting goods. ❖