Several industries use zirconium alloys as parts of equipment and machinery. In special, nuclear power plants use considerable amounts of high purity zirconium alloys as fuel cladding. However, when these fuel element parts are fabricated, machining chips from the alloys are generated. As these chips are not easily discarded as ordinary metallic waste, the recycling of this zirconium chips is important from economic and environmental perspectives. The present work presents one studied method for recycling zirconium alloys chips. The method is the powder metallurgy technique, where the chips were submitted to hydriding, hence the material was milled, isostatically pressed and sintered. The chemical composition, crystal phases, hardness and microstructures resulting from the method were characterized. The results strong suggest that this Zircaloy chips can be a source of high quality material that can be reused as biomaterials.