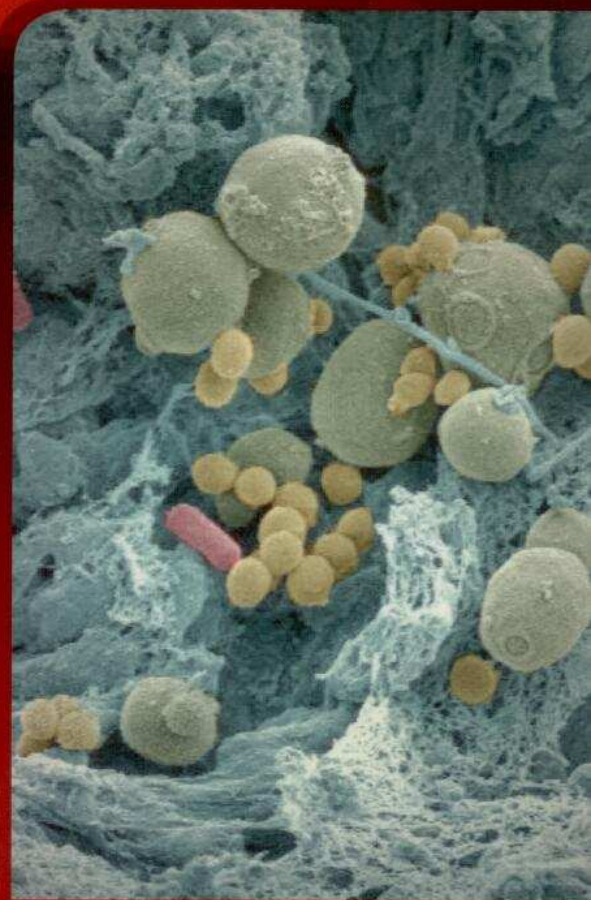


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Modification of wood involved in barrel production to avoid microbial colonisation

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In this work we report about a new way in order to avoid microbial colonization of barrels employed in wine production. The *Barrisques*, small barrels with a nominal volume of 225 L, are still produced using staves of *Quercus*, subjected to direct flame exposure during the assembly procedure. This practice gives to the *barrisques* special proprieties and encourages direct and positive effects on the wine quality. Despite these precious actions, the use of barrels leads some problems. The porosity and the inertness of wood favor the growth of a complex microbiota. New barrels are free from spoilage microorganisms but, after few months of wine storage, spoilage yeast and bacteria growth up to 10^3 - 10^4 cells/cm², and the sanitization techniques currently available have not shown a good efficacy.

This work suggests an innovative solution obtained by the deposition on the wood surface, of a membrane made by methyltriethoxysilane (MTES). The obtained composite material was evaluated using solid state NMR and ICP-MS to define the molecular structure of the inorganic matrix and the possible chemical interaction of MTES with wood components. Also, we have studied the bioactivity of the new material in order to prevent the colonization of spoilage microbes. Data demonstrated that the texture resulting from the condensation of MTES unities provides a narrow porosity that excludes the penetration of microorganisms through the silica film while, at the same time, fully preserving chemical exchanges between wood and wine. Finally, a series of alcoholic fermentation carried out in synthetic grape must in presence of silica coated wood specimens excludes any negative interaction between the new material and the winemaking procedure.